Draft Initial Environmental Examination

May 2014

BAN: Third Urban Governance and Infrastructure Improvement (Sector) Project – Magura Solid Waste Management Subproject

Prepared by the Local Government Engineering Department, Government of Bangladesh for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 7 May 2014)

Currency Unit	=	BDT
BDT1.00	=	$0.01289
$1.00	=	BDT 77.60

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	affected person
DoE	–	Department of Environment
DPHE	–	Department of Public Health Engineering
EARF	–	environmental assessment and review framework
ECA	–	Environmental Conservation Act
ECC	–	environmental clearance certificate
ECR	–	Environmental Conservation Rules
EIA	–	environmental impact assessment
EMP	–	environmental management plan
ETP	–	effluent treatment plant
GRC	–	grievance redressal cell
GRM	–	grievance redress Mechanism
IEE	–	initial environmental examination
LCC	–	location clearance certificate
LGED	–	Local Government Engineering Department
MLGRDC	–	Ministry of Local Government, Rural Development, and Cooperatives
O&M	–	operations and maintenance
PMO	–	project management office
PPTA	–	project preparatory technical assistance
REA	–	rapid environmental assessment
RP	–	resettlement plan
SPS	–	Safeguard Policy Statement
ToR	–	terms of reference

GLOSSARY OF BANGLADESHI TERMS

crore	–	10 million (= 100 lakh)
ghat	–	boat landing station
hartal	–	nationwide strike/demonstration called by opposition parties
khal	–	Solid Waste Management ditch/canal
khas, khash	–	belongs to government (e.g. land)
katcha	–	poor quality, poorly built
lakh, lac	–	100,000
madrasha	–	Islamic college
mahalla	–	community area
mouza	–	government-recognized land area
parashad	–	authority (pourashava)
pourashava	–	municipality
pucca	–	good quality, well built, solid
thana	–	police station
upazila	–	sub district

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
m	–	meter
mm	–	millimeter

NOTES

(i) In this report, "$" refers to US dollars.
(ii) —BDT. refers to Bangladeshi Taka

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Appendixes:

EXECUTIVE SUMMARY

1. After the successful implementation of the First and Second Urban Governance and Infrastructure Improvement Projects (UGIIP I and II)[1] in 74 selected *pourashavas*, the Local Government Engineering Department (LGED) within the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) with the financial assistance of Asian Development Bank (ADB) have planned to implement the third phase of the project titled the Third Urban Governance and Infrastructure Improvement Project (UGIIP-3) in selected 30 *pourashavas* over a period of 6 years (2014 to 2020).

2. The impact will be improved living environment in project towns. The outcome will be improved municipal service delivery and urban governance in project towns. Project towns are pre-selected 30 towns to be supported in an integrated manner under the project.

3. A sector-lending approach will be used for the project as it has been well established and successfully practiced in the UGIIP I and II.

4. The Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE), both under the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C) and having extensive experience in managing urban and water supply projects financed by ADB, will be the executing agencies of the project.

5. Magura solid waste management subject is one of the subprojects proposed under UGIIP-3. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS, 2009). This is the draft Initial Environmental Examination (IEE) based on the feasibility study and preliminary engineering designs prepared during project preparation. This IEE will be finalized during detailed design stage to reflect any changes and latest subproject designs.

6. **Categorization.** An environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for solid waste management (Appendix 1) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Magura solid waste management subject is classified as Environmental Category B as per the SPS as no significant impacts are envisioned. This initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject.

7. As per Government of Bangladesh Environment Conservation Act, 1995 (ECA, 1995) and Environment Conservation Rules (ECR, 1997), the subproject is categorized as "red" and

[1] The Government of Bangladesh with the assistance of ADB has introduced a system whereby funds/loans for development are disbursed in a phased manner based on the successful accomplishment by the recipient *pourashavas* of a set of performance-criteria in the area of urban governance. UGIIP I and II reflect this approach which aims to incentivize participating *pourashavas* to become well-managed and maintained towns in a sustainable way through systems of governance ensuring citizen's participation and inclusion of women, poor and the minority groups in *pourashava* activities. UGIIP I targeted for 27 and UGIIP II for 47 *pourashavas*. The subprojects were (i) water supply (ii) sanitation, (iii) solid waste management, (iv) urban drainage, (v) urban transport & communication and (vi) public use facilities.

location clearance certificate (LCC) and environmental clearance certificate (ECC) must be obtained from the DoE.

8. **Subproject Scope.** Investments under this subproject include: (i) development of a pilot scheme to improve source segregation and practice of 3R (reduce, reuse, and recycle) for 1,000 households within the *pourashava*;[2] (ii) improvement of solid wastes collection from the remaining households and disposal to proposed controlled landfill site; (iii) development of a controlled landfill site; and (iv) management of medical wastes.

9. **Implementation arrangements.** Local Government Engineering Department (LGED) is the executing agency (EA). LGED is responsible for providing support and guidance to *pourashavas* concerning performance criteria and *pourashava* development planning. Department of Public Health Engineering (DPHE) will provide support in water supply and sanitation schemes. Implementation activities will be overseen by a Project Management Office (PMO). The participating *pourashavas* are the implementing agencies, with a project implementation unit (PIU) within the *pourashava* structure. Consultant teams[3] are responsible for (i) detailed engineering design, contract documents preparation and safeguards facilitation; (ii) project management and administration support; (iii) assistance in supervising construction; (iii) strengthening of local governance, conducting required studies/surveys and (iv) awareness raising on behavioral change in water, sanitation and solid waste management activities.

10. **Description of the environment.** Subproject components are located in Magura urban area or in its immediate surroundings which were developed into urban land uses. The subproject sites are located in government-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Magura.

11. **Environmental management.** An environmental management plan (EMP) is included as part of this IEE, which includes (i) mitigation measures for environmental impacts during implementation; (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting; (iii) public consultation and information disclosure; and (iv) a grievance redress mechanism. A number of impacts and their significance were reduced through mitigation measures in the preliminary design stage. The EMP will form part of the civil work bidding and contract documents.

12. Locations and siting of the proposed infrastructures were considered to further reduce impacts. The concepts considered in design of the Magura solid waste management subject are: (i) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (ii) prioritizing rehabilitation over new construction, using vacant government lands; (iii) taking all possible measures in design and selection of sites to avoid resettlement impacts; (iv) avoiding where possible locations that will result in destruction/disturbance to historical and cultural places/values; (v) avoiding tree-cutting where possible; (vi) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosure

[2] Pilot study includes (i) waste segregation at household level; (ii) collection of segregated organic and inorganic wastes; (iii) composting of organic wastes; and (iv) recycling of inorganic wastes.

[3] Consultant teams are composed of Management Design and Supervision Consultants (MDSC) and Governance Improvement and Capacity Development Consultants (GICDC).

for site selection. As a result, some measures have already been included in the subproject designs. This means that the impacts and their significance have already been reduced.

13. During the construction phase, impacts mainly arise from (i) disturbance of residents, businesses, and traffic; (ii) need to manage excess construction materials and spoils; and (iii) community and workers health and safety. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Measures such as conducting work in lean season and minimizing inconvenience by best construction methods will be employed. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

14. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

15. **Consultation, disclosure and grievance redress.** The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the *pourashava* and will be disclosed to a wider audience via the ADB and LGED project websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

16. **Monitoring and reporting.** The PMO, PIU (Magura *pourashava*), and Management Design and Supervision Consultants (MDSC) will be responsible for safeguard monitoring. The MDSC will submit monthly monitoring reports to PMO, and the PMO will send semi-annual monitoring reports to ADB. ADB will post the semi-annual environmental monitoring reports on its website as part of its disclosure requirements.

17. **Conclusions and Recommendations.** The citizens of Magura will be the major beneficiaries of this subproject. With the improved solid waste management services they will enjoy improved over-all cleanliness, livability and better public health in the *pourashava*. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Magura will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

18. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009).

I. INTRODUCTION

1. After the successful implementation of the First and Second Urban Governance and Infrastructure Improvement Projects (UGIIP I and II)[4] in 74 selected *pourashavas*, the Local Government Engineering Department (LGED) within the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) with the financial assistance of Asian Development Bank (ADB) have planned to implement the third phase of the project titled the Third Urban Governance and Infrastructure Improvement Project (UGIIP-3) in selected 30 *pourashavas* over a period of 6 years (2014 to 2020).

2. The impact will be improved living environment in project towns. The outcome will be improved municipal service delivery and urban governance in project towns. Project towns are pre-selected 30 towns to be supported in an integrated manner under the project.

3. A sector-lending approach will be used for the project as it has been well established and successfully practiced in the UGIIP I and II.

4. The Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE), both under the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C) and having extensive experience in managing urban and water supply projects financed by ADB, will be the executing agencies of the project.

5. Magura solid waste management subject is one of the subprojects proposed under UGIIP-3. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009.

6. **Categorization.** An environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for solid waste management (**Appendix 1**) was conducted and results of the assessment show that the project is unlikely to cause significant adverse impacts. Magura solid waste management subproject is classified as environmental category B as per ADB SPS, 2009. This initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

[4] The Government of Bangladesh with the assistance of ADB has introduced a system whereby funds/loans for development are disbursed in a phased manner based on the successful accomplishment by the recipient *pourashavas* of a set of performance-criteria in the area of urban governance. UGIIP I and II reflect this approach which aims to incentivize participating *pourashavas* to become well-managed and maintained towns in a sustainable way through systems of governance ensuring citizen's participation and inclusion of women, poor and the minority groups in *pourashava* activities. UGIIP I targeted for 27 and UGIIP II for 47 *pourashavas*. The subprojects were (i) water supply (ii) sanitation, (iii) solid waste management, (iv) urban drainage, (v) urban transport & communication and (vi) public use facilities.

7. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

8. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
(ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

9. This draft IEE for the Magura solid waste management subproject is based on the feasibility study and preliminary engineering designs prepared during project preparation. This IEE will be finalized during detailed design stage to reflect any changes and latest subproject designs.

10. **Environmental management plan.** An EMP, which addresses the potential impacts and risks identified by the environmental assessment, shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

11. **Public disclosure.** ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

(i) for environmental category A projects, draft EIA report at least 120 days before Board consideration;
(ii) final or updated EIA and/or IEE upon receipt; and
(iii) environmental monitoring reports submitted by the project management unit (PMO) during project implementation upon receipt.

B. National Laws

12. Implementation of all subprojects will be governed by the environmental acts, rules, policies, and regulations of the Government of Bangladesh. These regulations impose restrictions on the activities to minimize/mitigate likely impacts on the environment. Many of

these are cross-sectoral and several of them are directly related to environmental issues. The most important of these are the Environment Conservation Act, 1995 (ECA, 1995), and the Environment Conservation Rules (ECR, 1997).

13. Table 1 presents specific requirements for the Magura kitchen market subproject. **Appendix 2** provides the environmental standards for air, surface water, groundwater, drinking water, emissions, noise and vehicular exhaust.

Table 1: Applicable Government of Bangladesh Environmental Legislations

	Legislation	Requirements for the Project	Relevance
1.	Environmental Conservation Act of 1995 and amendments in 2000, 2002 and 2010 [5]	• Restriction on operation and process, which can be continued or cannot be initiated in the ecologically critical areas • Regulation on vehicles emitting smoke harmful to the environment • Remedial measures for injuries to ecosystems • Standards for quality of air, water, noise and soil for different areas for various purposes and limits for discharging and emitting waste • Environmental guidelines	The provisions of the act apply to the entire subproject in the construction and operation and maintenance (O&M) phases.
2.	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	• Environmental clearances • Compliance to environmental quality standards	The subproject is categorized as red and requires locational clearance certificate (LCC) and environmental clearance certificate (ECC). All requisite clearances from DoE shall be obtained prior to commencement of civil works.
3.	Forest Act of 1927 and amendments (2000)	• Clearance for any felling, extraction, and transport of forest produce	Considered in subproject preparation and implementation.
4.	Bangladesh Climate Change Strategy and Action Plan of 2009	• Ensure existing assets is put in place to deal with the likely impacts of climate change. • Enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change	Considered in subproject preparation and implementation.
5.	Bangladesh Labor Law of 2006	• Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement • Prohibition of employment of children and adolescent	Considered in the EMP.

[5] *ECA Amendment 2000* focuses on ascertaining responsibility for compensation in cases of damage to ecosystems, increased provision of punitive measures both for fines and imprisonment and the authority to take cognizance of offences. *ECA Amendment 2002* elaborates restrictions on polluting automobiles; restrictions on the sale, production of environmentally harmful items like polythene bags; assistance from law enforcement agencies for environmental actions; break up of punitive measures; and authority to try environmental cases. In *ECA Amendment 2010,* no individual or institution (government or semi-government/non-government/self-governing can cut any hill or hillock; fill-up or changed any remarked water body however in case of national interest; the mentioned activities can be done after getting clearance from respective the departments.

	Legislation	Requirements for the Project	Relevance
6.	Bangladesh Medical Waste Rules, 2008	• Main legal instrument for regulating medical waste management in Bangladesh • Specify process and operational conditions for collection, transport and treatment of medical wastes	Considered in subproject preparation and implementation.

C. Government of Bangladesh Environmental Assessment Procedures

14. Under ECA, 1995 and ECR, 1997 industrial units and projects are classified into four categories according to "their site and impact on the environment", and each category (green, orange-A, orange-B and red) requires a different level of environmental assessment as a prerequisite for the Department of Environment (DoE) in granting the LCC and ECC that allow the project to proceed.

15. As per Schedule 1 of ECA, 1995 Magura solid waste management subproject is likely to be classified as red category (Table 2). Thus ECC is required from the DoE prior to commencement of the subproject.

Table 2: Likely Government of Bangladesh Classification of Magura Solid Waste Management Subproject

	Subproject	Component	Equivalent in Schedule I of ECR 1997	DoE Classification
1.	Solid waste management	Community storage bins	No similar facility	Green (because bins and STS are small and unlikely to have major impacts)
		Secondary transfer station	No similar facility	Green (because bins and STS are small and unlikely to have major impacts)
		- Waste disposal (includes sanitary landfill, composting site, or access road) - Medical waste treatment facility	Land-filling by industrial, household and commercial wastes	Red

16. Rule 7 of the ECR, 1997 indicates that the application for ECC must be made to the relevant DoE Divisional Officer, and the application for red category projects will include the following:

(i) Completed application for ECC, and the appropriate fee;
(ii) Report on the feasibility of the project;
(iii) Report on the IEE for the project, and terms of reference (TOR) for the EIA; or EIA report prepared on the basis of TOR previously approved by DoE;
(iv) Report on the environmental management plan (EMP);
(v) No objection certificate from the local authority;
(vi) Emergency plan relating to adverse environmental impact and plan for mitigation of the effect of pollution; and
(vii) Outline of the relocation and rehabilitation plan (where applicable).

17. DoE has 60 days to respond to receipt of the ECC application for a red category project.

18. This draft IEE will serve the basis for the ECC application and will be supplemented to fulfill any additional government requirements.

III. DESCRIPTION OF THE PROJECT

A. The Study Area

19. Magura *pourashava* lies between 23°15´ and 23°41´ north latitudes and between 89°15´and 89°42´ east longitudes. It has a total area of 47.30square kilometers (km^2).

20. Subproject components are located in Magura *pourashava* urban area or in its immediate surroundings which were converted into urban use for many years ago, and there is no natural habitat left at these sites. The subproject sites are located in government-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Magura. The location map is shown as **Figure 1**.

B. Existing Condition and Need for the Project

21. The *pourashava* generates approximately 34 metric tons (MT) of waste per day with a generation rate of about 0.25 kg/capita/day. At present, there are 40 fixed dustbins located in different parts of the *pourashava* along with 30 to 40 temporary secondary disposal points. The *pourashava* has 2 open trucks for waste collection and 10 rickshaw vans. The waste collection rate is 45%.Collected wastes is being disposed in the *pourashava*'s 3.10 acre (1.25 hectares) dumping site[6] or in instances requested by private land owners, dumped in low-lying areas to increase the land levels. **Figure 2** shows the current system of solid waste management in Magura *pourashava*.

22. Households, commercial, institutional wastes and others are piled up in the secondary storage points. The pourashava collects waste from these designated points. Beside this, wastes from markets, institutions etc. are also collected by the pourashava. Informal sector is prominent in recyclable collection and recycling. Rag-pickers and ferrywalas collect recyclable materials from roadside bins or from the households and sell it to buyers.

23. The estimated total medical waste generation in Magura *pourashava* is around 425 kilograms (kg) per day of which 340 kg is non-hazardous, 60 kg is infectious and 15 kg is sharp waste. Medical wastes are collected separately by two collection vans deployed by the hospital and clinic owners' association in the *pourashava*. Open burning of hazardous and infectious wastes is currently being practiced by some hospitals and clinics. The residues from burning are then put into holes dug, usually within their premises, and covered with soil.

24. The *pourashava* conservancy section has 3 permanent supervisory staff (1 conservancy inspector and 2 conservancy supervisors). They have a good monitoring system (attendance records) to supervise the activities of 138 daily basis cleaner (8 drain cleaners, 8 truck cleaners, 10 van operators and helpers), 101 road sweepers and 2 truck drivers.

[6]The existing dumping site located along Dhaka-Jessore-Khulna Highway is adjacent to the national highway. It is being used by Magura *pourashava*. The area is low-lying.

25. There is no regular public awareness and public relation activities in the *pourashava*. Community involvement in waste collection had been started in two wards under DPHE's 18 District Towns Water Supply and Sanitation Project. However the program was discontinued after the project period.

26. There are two locations in the Ward No. 9 where currently wastes are disposed of and the environment there is very filthy and people around there are very much unhappy of the current environment. The *Nagorik* committee (civil society) in Ward No. 9 is implementing a community-led solid waste collection system involving 200 households in a *para* or *moholla* (a *para* or *moholla* is a small community in a ward with common interests and vision). Under the scheme a manually-driven vehicle (tricycle with a large metal box behind) has been purchased by the pourashava to collect wastes from the households daily. The waste collector uses a whistle to inform the household for waste pick-up. The household will then come out and hand over the wastes which are usually mixed (not segregated). The mixed wastes are put in the large metal box together with other collected wastes for disposal to the existing dumpsite along Dhaka-Jessore-Khulna Highway(about 2.5 km away from the core urban area of the pourashava).The waste collector maintains a registration book showing households pay 50 BDT per month for the service. The payment goes to the *Nagorik* committee's cashier. The *Nagorik* committee closely monitors the service; and advises and supports the waste collector is his activities. The Nagorik committee pays the waste collector 5,000 BDT per month as salary. The remaining money is used for O&M of the van.

C. Proposed Components

27. **Overall approach for solid waste management in Magura.** The overall approach for solid waste management in Magura Pourashava will initially involve implementation of a pilot scheme based on 3R (reduce, reuse and recycle) approach and lessons-learned in the on-going community-led solid waste management system in selected households within the *pourashava*; and at the same time solid waste collection system will be improved in the remaining parts of the *pourashava*. To ensure scientific disposal of collected wastes, the existing dumpsite along Dhaka-Jessore-Khulna Highway will be rehabilitated and upgraded into a controlled landfill. Medical wastes, which currently untreated and end up being disposed in the dumpsite, will also be managed to ensure pathogens and harmful components are eliminated prior to disposal in the controlled landfill. Magura pourashava staff capacity will be improved to enable them to manage the system. The community will be involved in various awareness raising activities to ensure sustainability of the subproject.

28. Investments under this subproject include: (i) development of a pilot scheme for 1,000 households within the *pourashava*;[7] (ii) improvement of solid wastes collection from the remaining households and disposal to proposed controlled landfill site; (iii) development of a controlled landfill site; (iv) management of medical wastes; and (v) capacity building of *pourashava* staff and community awareness raising activities.

(i) Development of a pilot scheme

[7] Pilot study includes (i) waste segregation at household level; (ii) collection of segregated organic and inorganic wastes; (iii) composting of organic wastes; and (iv) recycling of inorganic wastes.

82. The proposed pilot scheme is presented in **Figure 3.** In the development of the proposed pilot scheme the lessons from the on-going community-led solid waste management scheme in Ward No.9 have been drawn. A pilot scheme under UGIIP-3 will be implemented for 2 years:

(i) a memorandum of understanding (MOU) will be made between the Nagorik committee and Magura *pourashava*;
(ii) 1, 000 households in Ward No.9 will be selected, provided with color-coded waste bins and capacitated to practice 3R;
(iii) the 2 locations currently being used as dumping grounds in Ward No. 9 will be used as collection points for organic wastes by *pourashava* waste trucks;
(v) *Nagorik* committee will implement pilot scheme to be closely monitored by Magura *pourashava*;
(vi) On year 1 of implementation Magura *pourashava,* with the assistance of consultant teams,[8]will evaluate and document the lessons learnt from the scheme. Necessary adjustments to improve implementation will be done during this period; and
(vii) Towards the end of the year 2 Magura *pourashava,* with the assistance of consultant teams,[9]prepare solid wastes management operation guidelines for replication of the scheme in other areas of the *pourashava*.

29. Investments under the project to implement the pilot schemes include: (i) procurement of 2,000 waste bins (1,000 for organic and 1,000 for non-biodegradable wastes); (ii) procurement of tricycle 6 tricycle rickshaws to be fitted with 30-liter capacity plastic bins; and (iii) procurement of uniforms, personal protective equipment, and tools for the waste collectors.

(ii) Improvement of *pourashava-wide* solid wastes collection and disposal

30. Investments under the project to improve current situation include procurement of: (i) collection vehicles (2 trailers, 1 tractor and 1 dump truck); and (ii) uniform, personal protective equipment, and tools for the *pourashava* waste workers.

(iii) Development of a controlled landfill site

31. The existing dumpsite along Dhaka-Jessore-Khulna Highway (1.2 hectares area owned by Magura pourashava) will be rehabilitated and upgraded to a controlled landfill. Preliminary design includes (i) earthen embankment to isolate it from the surrounding agriculture lands; (ii) extensive plantation of trees on the embankment and its outer side slopes to make the surrounding areas further isolated; (iii) a composting plant capable of composting 5MT of organic wastes per day; (vi) leachate collection, holding pond; and recirculation system; (v) groundwater protection[10]; (vi) shed for vehicles; and (vii) office and workers room complete with water supply and sanitation facilities. The layout of the compost plant is provided in **Figure 4**. The layout of the controlled landfill is shown in **Figure 5**.

[8] Consultant teams are composed of Management Design and Supervision Consultants (MDSC) and Governance Improvement and Capacity Development Consultants (GICDC).
[9] MDSC solid waste management specialist
[10] Two options to be explored during detailed design phase are: (i) if there is an impermeable clayey layer of required depth, there is no requirement for groundwater protection measures; (ii) in absence of such layer, the controlled landfill should be designed with HDPE liners. Soil profile data at the site was not available during preliminary design stage thus use of HDPE liners has been considered to calculate the costs of the subproject.

32. Wastes will be covered on daily basis by soils to control odor and prevent animals/flies (cats, dogs, rats, etc.) from being attracted to wastes. In case soils are not available then matured wastes will be used for coverage.

(iv) Management of medical wastes

33. The schematic model to improve medical waste management in Magura pourashava is shown in **Figure 6**.Government hospital, private clinics and diagnostic centers in the pourashava will be required to properly manage their hazardous and infectious medical wastes. The non-hazardous medical wastes will be allowed to be disposed with household wastes. While hazardous and infectious wastes will require treatment prior to disposal to the controlled landfill.

34. Investment under the project to improve management of medical wastes include: (i) procurement of 200 sets of 3-colored waste bins;[11] (ii) procurement of a covered van for collection and transport of infectious and sharp wastes to the medical treatment facility; (iii) procurement of 2 rickshaw vans for collection of non-hazardous medical wastes; and (iv) construction of a medical waste treatment facility.

35. The covered van will be given to the hospital, clinic and diagnostic center association in the *pourashava*. Table 3 presents 2 potential options considered during the project preparation stage. The factors used in comparing the 2 technologies include technical, operational, regulatory, potential environmental impacts and magnitude of mitigation measures required to reduce the impacts to manageable levels. The information provided in the table is based on similar operating medical waste treatment facilities in Bangladesh, specifically Dhaka City's incinerators and autoclaves. The incinerators being used in other cities which are locally-produced single chamber similar to brick burning chambers will not be considered in the project.

Table 3: Comparison of Medical Waste Treatment Options for Magura Pourashava

Parameter	Incinerator	Autoclave
Process and control parameter	Incinerator is a combustion process which reduces weight and volume of the wastes by 90%-95% producing flue gases and non-combustible residue (ash). Management of flue gases and ash requires careful consideration. Temperature is a controlling parameter of incinerator.	Autoclave is a sterilization process where temperature & pressure, steam penetration in the waste material, contact time are the influencing factors for controlling proper disinfection.
Capital and recurrent costs	Incinerator needs high capital and operating costs. For 20 kg/hr capacity double chamber pyrolitic combustion incinerator costs around 40 to 50 lac. taka with air pollution control device dry scrubber 10 lac /wet scrubber 15 lac taka. For Incinerator: i) Cost of Incinerator (20kg/hr) (Pyrolitic two combustion chambers) = Tk. 40,00,000 ii) Cost of Air pollution control unit (Dry scrubber) = Tk. 10,00,000	Relatively low capital and operating costs. The capital cost of 125 liter capacity autoclave is around 25 -30 lac taka including the boiler. For size reduction of autoclaved wastes, it needs additional cost of shredder of about 2 lac taka. For Autoclave: i) Cost of Autoclave (125 liter/hr) including boiler: Tk 30,00,000 ii) Facility construction = Tk. 7,50,000 iii) Cost of Shredder=50,000

[11] One for non-hazardous medical wastes, one for hazardous infectious wastes and the other for hazardous sharp wastes (needles etc.).

Parameter	Incinerator	Autoclave
	or Cost of Air pollution control unit (Wet scrubber) = Tk. 15,00,000 iii) Facility construction = Tk.7,50,000 iv) Installation (5% of the capital cost) =Tk. 2,50,000 v) Ash pit = Tk. 1,00,000 vi) Cost for safety gears = Tk.10,000 Recurrent cost: i) Staff wage (2) = Tk. 3,00,000 ii) Fuel cost (Kerosene/diesel) = Tk. 70,000 iii) Electricity cost = Tk. 40,000 iv) Maintenance cost = Tk. 1,00,000 v) Training cost = Tk. 15,000 vi) Cost for test prescribed by DOE = Tk. 50,000 vii) Cost test for dioxin, furan ,ash content etc. as per EPA guideline = US$10,000	iv) Installation (5% of the capital cost) : Tk. 1,50,000 v) Cost for separate disposal cell of disinfected waste = Tk. 1,00,000 vi) Cost for a sharp pit = Tk. 1,00,000 vii) Cost of small ETP = Tk. 50,000 viii) Cost for safety gears = Tk. 10,000 Recurrent cost: i) Staff wage (2)=Tk. 3,00,000 ii) Fuel cost (kerosene/diesel) for steam boiler = Tk. 70,000 iii) Electricity cost = Tk. 40000-Tk. 50,000 iv) Maintenance cost = Tk. 70,000 v) Water cost = Tk. 5000 vi) Training cost = Tk. 15,000 ix) Cost for routine test and test prescribed by DOE: Tk. 30,000
Potential environmental impacts and their feasibility of mitigation	Potential pollution risks and concerns associated with incineration process (dioxin, furan and their carcinogenicity). No burning of chlorinated plastic, maintaining temperature of around 850^0C, increasing combustion efficiency and using emission control equipment such as dry scrubber/bag filter or wet scrubber etc. can mitigate potential risks. Air pollution control equipment has to be used to control emission of particulate matter and toxic substances from the flue gases. The ash need to be disposed of in a pit.	Autoclave has a low environmental impact from emission. However, it has inability to change waste appearance, inability to change waste volume and production of pungent odor and uncharacterized air emission. The odor will not create any public nuisance if it will be operated in the landfill in a closed room. The volume and appearance of wastes can be changed by shredding and disposal will be done in a separate cell of landfill.
Standards need to be maintained according to Medical Waste Management Handing Rules 2008	a. Operating Standards: i) Combustion efficiency shall be at-least 99% ii) The temperature of the primary chamber shall be 800 ± 50^0C iii) The secondary chamber gas residence time shall be at-least 1 second at 1050 ± 50^0C with minimum 3% oxygen in the stack gas. b. Emission standard s: i) Particulate matter 150 mg/Nm^3, Nitrogen Oxide 450 mg/Nm^3, HCL 50 mg/Nm^3 ii) Minimum stack height shall be 30m above ground, iii) Volatile organic compounds in ash shall not be more than 0.01%.	When operating a gravity flow autoclave, medical waste shall be subjected to: (i) A temperature of not less than 121^0C and pressure of 15 psi for an autoclave residence time of not less than 60 mins; or (ii) A temperature of not less than 135^0C and pressure of 31 psi for an autoclave residence time of not less than 45 mins; or (iii) A temperature of not less than 149^0C and pressure of 52 psi for an autoclave residence time of not less than 30 mins. Hazardous Medical waste shall not be considered properly treated unless the time, temperature and pressure indicators indicate that the required time, temperature, and pressure are reached during the autoclave process.
Air Quality monitoring as per	In Bangladesh, the operating and	Hazardous medical waste shall not

Parameter	Incinerator	Autoclave
medical waste management rules 2008	emission standards of Incinerator are: i) The combustion efficiency shall be at least 99%. ii) Particulate matter 150 mg/Nm^3, Nitrogen Oxide 450 mg/Nm^3, HCL 50 mg/Nm^3 iii) Minimum stack height shall be 30m above ground, iv) Volatile organic compounds in ash shall not be more than 0.01%. Emission from the stake of the incinerator has to be done twice a year or sometimes four times in a year when the facility is installed in a town. For stake test, it has to pay Tk. 3000 each time. According to EPA guideline for incinerator operation, dioxin, furan, SOx, HCL, NOx etc. has to be tested. Ash has to be tested to find out heavy metal content etc. which is normally not tested in Bangladesh and expensive as well.	be considered properly treated unless the time, temperature and pressure indicators indicate that the required time, temperature and pressure are reached during the autoclave process. When operating a gravity flow autoclave, medical waste shall be subjected to: (i) A temperature of not less than 121^0C and pressure of 15 psi for an autoclave residence time of not less than 60 mins; or (ii) A temperature of not less than 135^0C and pressure of 31 psi for an autoclave residence time of not less than 45 mins; or (iii) A temperature of not less than 149^0C and pressure of 52 psi for an autoclave residence time of not less than 30 mins. Each autoclave shall have graphic or computer recording devices, which will automatically and continuously monitor and records dates, time of day, load identification number and operating parameters throughout the entire length of the autoclave cycle. Spore test: Biological indicator for autoclave shall be Bacillus stearothermophilus spores using vials or spore strips with atleast 1×10^4 spores per milliliter. Routine test: A chemical indicator strip/tape that changes colour when a certain temperature is reached can be used to verify that a specific temperature has been achieved. It may be necessary to use more than one strip over the waste package at different location to ensure that the inner content of the package has been adequately autoclave.
Institutional training and monitoring requirement	With a basic understanding of incinerator technology and air pollution control mechanism is needed. Well trained operator can monitor and control combustion.	Needs a basic training to monitor temperature, pressure and residence time for the sterilization effectively done.

36. Medical waste treatment through autoclave will be the potential option for Magura pourashava. Autoclave needs relatively low capital and operating costs which can easily be managed by the pourashava. The temperature, pressure and the residence time if maintained as stated in the regulatory control, there will be fully disinfection of the infectious wastes. Monitoring test of the disinfected waste is very simple and can be done by vial or spore strip as explained regularly. The following are the recommendations for to be included in the final design of the facility:

(i) Locate the autoclave in the proposed landfill site to meet locational requirements of DOE.
(ii) Include in the design size reduction units appropriate for the treated medical wastes (including but not limited to mechanical shredders).
(iii) Allocate in the proposed landfill site an enclosed area with minimum size of 20 feet x 30 feet for the autoclave. Additional minimal area may be required for the size reduction units and sorting room, as generally required by DOE in its previous issuances of ECCs in similar facilities.
(iv) Provide back-up power source to ensure uninterrupted operations of the autoclave.
Include in the proposed landfill site a separate cell for treated medical wastes.
(v) Implement strictly segregation at source. The Magura *pourashava* will need to work closely with the clinic owners association and government hospitals.
(vi) Include waste criteria conditions in the O&M manual (to be developed by contractor) and ensure only medical wastes appropriate for treatment are included.
(vii) Include workers health and safety measures in the O&M manual.
(viii) The steam discharge from the autoclave shall be run through small effluent treatment plant (ETP), therefore the steam which will convert to effluent upon contact with ambient air will be treated prior to discharge. The effluent shall be monitored by DOE as part of the Environmental Management Plan.
(ix) Include measures in the O&M manual to control pungent odor and uncharacterized air emission which are commonly observed in operating autoclaves. These measures include, but not limited to, not opening the autoclave door until such time it is deemed to be opened safely and the odor has been dissipated. This procedure will also ensure workers protection from exposure to extreme temperature and scalding from steam. The specific time and conditions shall be set by the contractor during the commissioning of the autoclave and reflected in the O&M manual to be turned over to Magura pourashava and operators.
(x) In the preliminary design, the autoclave will be commissioned by the contractor for 1 year. The contractor shall operate and maintain it for that period which will be specified in the service contract. The Contractor will provide training to identified Magura *pourashava* staff and/or operators. After this period, the operation and maintenance will be taken over by the Magura *pourashava* staff. The cost of this service contract has been added to Phase 2 costs for SWM. The Magura Phase SWM cost is limited to preparatory works.
(xi) Ensure sustainability of operations by considering various options as practiced in Bangladesh such as considering, but not limited to public-private partnerships, NGO-led operation, or tie-up with operators of landfill site.

(v) Capacity building and community a**wareness campaign**

37. The subproject will involve training waste workers (drivers, collectors, landfill operators, etc.) and *Nagorik* committees. Awareness raising campaigns will be done by Magura pourashava with assistance of the consultant teams to promote the 3R.

38. Under the SWM subproject, a medical waste management association will be formed involving the owners of the private clinics and diagnostic centers, and the government hospital authority. The association will need to have the capacity in operation and maintenance of the designed service. The workers involved in the medical waste collection, transfer and disposal also need the relevant training. A technical person needs to be appointed to operate the

incinerator and he/she needs to be trained in the whole process of incinerating hazardous and infectious wastes (what, when and how).

37. Preliminary designs have been made considering the above factors. The inventory and proposed interventions are listed in Table 4.

Table 4: Components of Magura Solid Waste Management Subproject

Components	Materials/goods	Unit	Units	Area Required and Location
A. Primary waste collection				
i. Waste collection plastic bins for 1,000 households	- color coded (green for organic, blue for inorganic), - 10 liter (L) capacity, covered	Numbers (Nos.)	2,000	None. To be located within premises of households.
ii. Tricycle rickshaws – each tricycle to be fitted with 6 30-L capacity plastic bins. One tricycle rickshaw will collect inorganic wastes from 200 households	Tricycle	Nos.	6	Not applicable.(NA)
	Large size plastic bins	Nos.	36	NA
iii. Uniforms and personal protective equipment (PPE) for use by the household waste workers/collectors	Uniform and PPE	Sets	12	NA
B. Secondary waste collection				NA
i. 2 Trailers with 1 tractor for waste handling	Trailers Tractors	Nos.	2 1	NA
ii. Dump truck (3 ton capacity) for waste transportation	Dump truck	Nos.	1	NA
iii. Uniforms and personal protective equipment (PPE) for use by the waste workers at the transfer station and MRFs	Uniform and PPE	Sets	10	NA
C. Composting plant				
Construction of composting plant (semi-mechanized with aerobic composting) with shredders, aerators, turning and sieving equipment, bagging, quality control equipment, etc.	5 tons capacity	No.	1	Area = 360 m^2 at landfill site
Uniforms and personal protective equipment (PPE) for use by the waste workers at the composting plant	Uniform and PPE	Sets	10	NA
D. Medical Waste collection and Treatment				
Supply color coded bins (three types) for source-segregation of different types of medical waste, covered vans for waste collection, treatment by auto- incinerator	Three types of color coded bins	No.	200	NA
	Covered van	No.	1	NA
	Tricycle rickshaws	No.	2	NA
	Autoclave	No.	1	Within the landfill site
	hazardous waste storage sorting room and staging area	No	1	Within the landfill site
	Back-up power generator	No	1	Within the landfill site
E. Controlled landfill				
Construction of embankment and tree plantation		m	320	Around the landfill site
Construction of impermeable layer at the base of the site and inner side slope of the		m^2	13750	Base area and area of inner side slope of the

Components	Materials/goods	Unit	Units	Area Required and Location
embankment for groundwater protection, in case no underneath impermeable soil layer there (subject to the detailed geological investigation during detailed design)				embankment
Construction of leachate collection pond		m^2	30	
Leachate collection pipe		m	2000	
Leachate circulation systems-- hose pipe, pump, sprinklers, etc.		set	1	Within the landfill site
Worker shed	CC floor with tin roof supported over iron truss	m^2	20	At the front side of the landfill site
Heavy equipment shed	RCC floor with tin roof supported by iron truss	m^2	40	At the front side of the landfill site
Compost plant/area	Office, worker shed, bagging area, screen shed, curing shed, windrow platform,	m^2	360	Within the landfill site
Water supply and sanitation				At all required locations
Storm water drainage		m	350	Along the embankment
Wheel loader	Wheel loader	No.	1	To be parked at the heavy equipment shed
Uniforms and personal protective equipment (PPE) for use by the waste workers at the controlled disposal site.	Uniform and PPE	Sets	20	Not applicable.
F. Awareness campaigning, capacity building training				
Awareness campaigning	Advertisement on newspapers,	No	24	NA
	Posters	No	5000	NA
	discussion meetings, etc.	No	12	NA
Capacity building training	Pilot scheme-van drivers and waste pickers (20 participants)	No.	2	NA
	Medical waste management- private clinics, diagnostic centers, government hospital (50 participants)	No.	2	NA
	Waste collector/van drivers (10 participants)	No.	1	NA
	Incinerator operation Technician (2 technicians)	No.	1	NA
	Pourashava personnel (10 participants)	No.	2	NA
	Landfill workers (10 participants)	No.	2	
	Composting technicians and workers (10)	No.	2	NA

D. Implementation Schedule

38. Implementation of UGIIP-3 is split up into 3 phases: (i) 1st phase = 18 months or 1.5 years; (ii) 2nd phase = 30 months or 2.5 years; and (iii) 3rd phase = 24 months or 2 years

39. The subproject will be implemented under Phase 1. Preliminary design has been done by the PPTA team and will be finalized during detailed design stage. It is estimated that construction period will cover 18 months.

40. The final detailed implementation schedule will be provided in the updated IEE once the detailed design phase is completed.

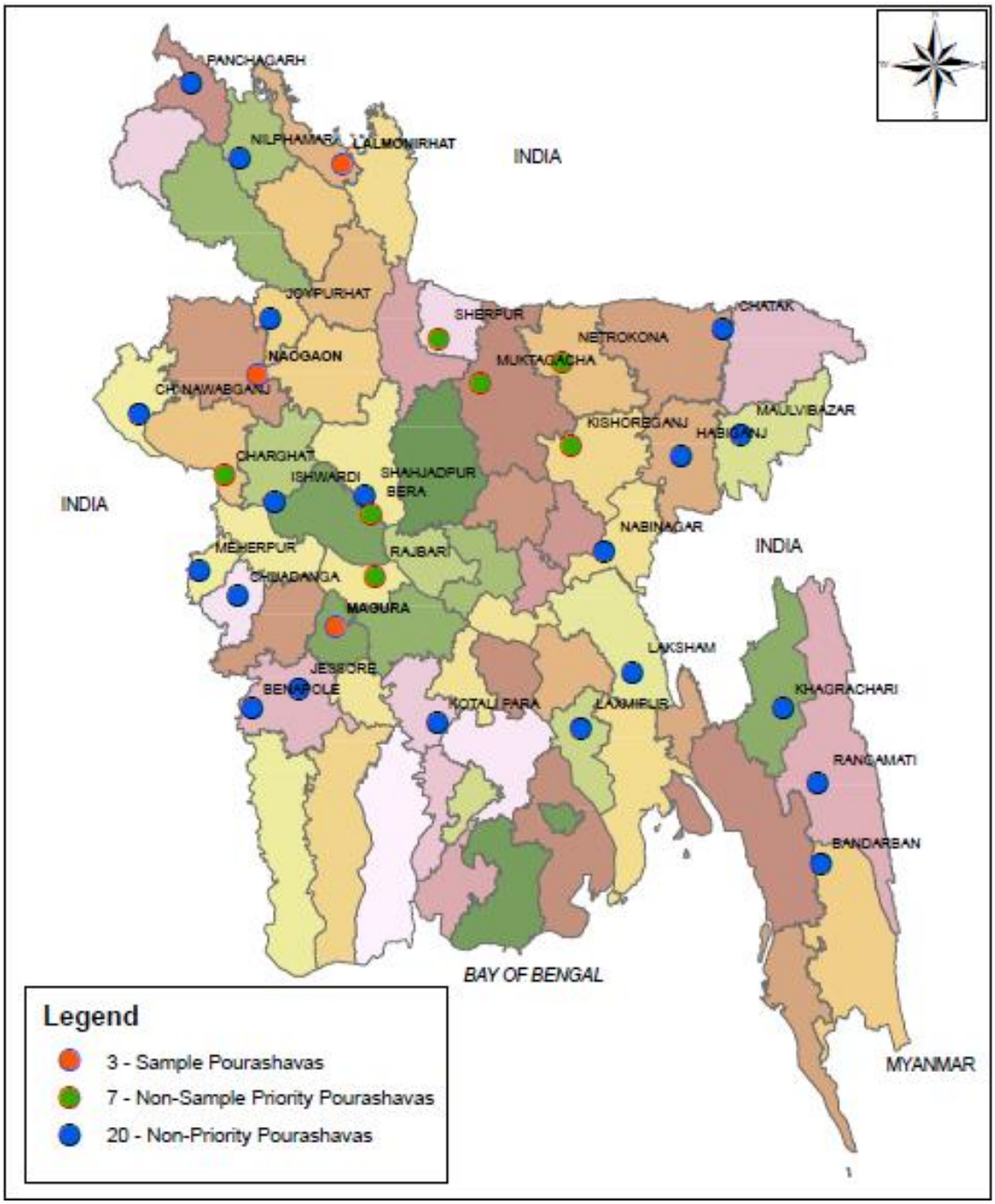


Figure 1: Location Map of UGIIP-3 Pourashavas

Figure 2: Existing solid waste management in Magura

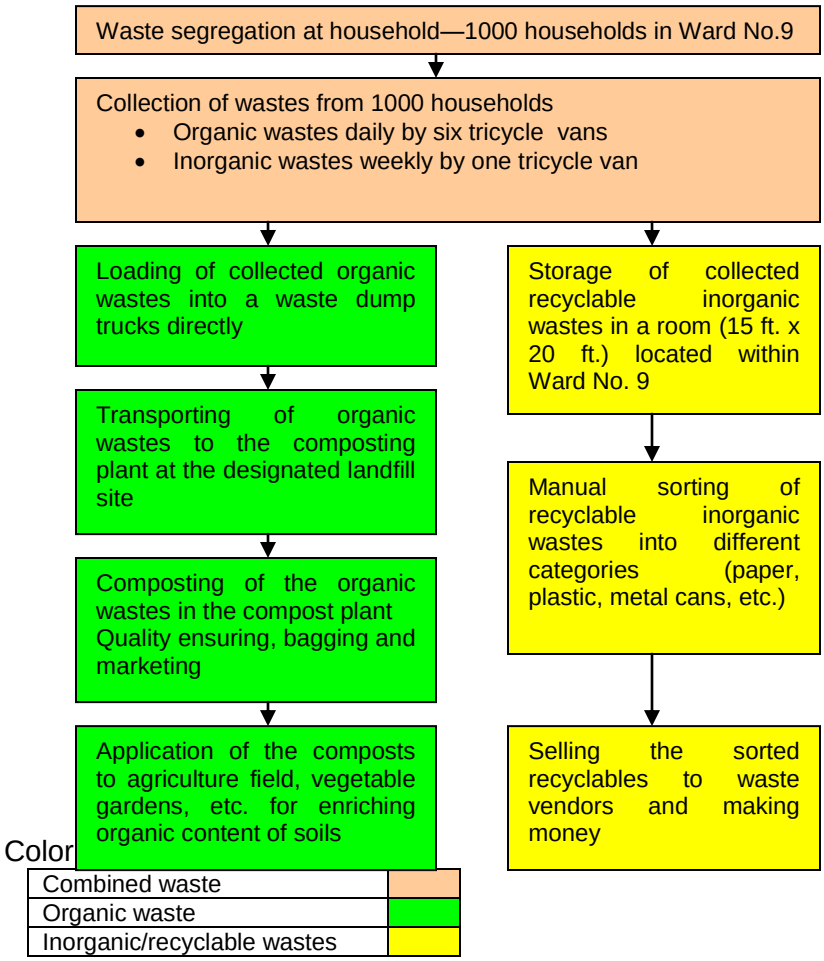


Figure 3: Schematic Diagram of Solid Waste Management Scheme Pilot Scheme in Magura Pourashava

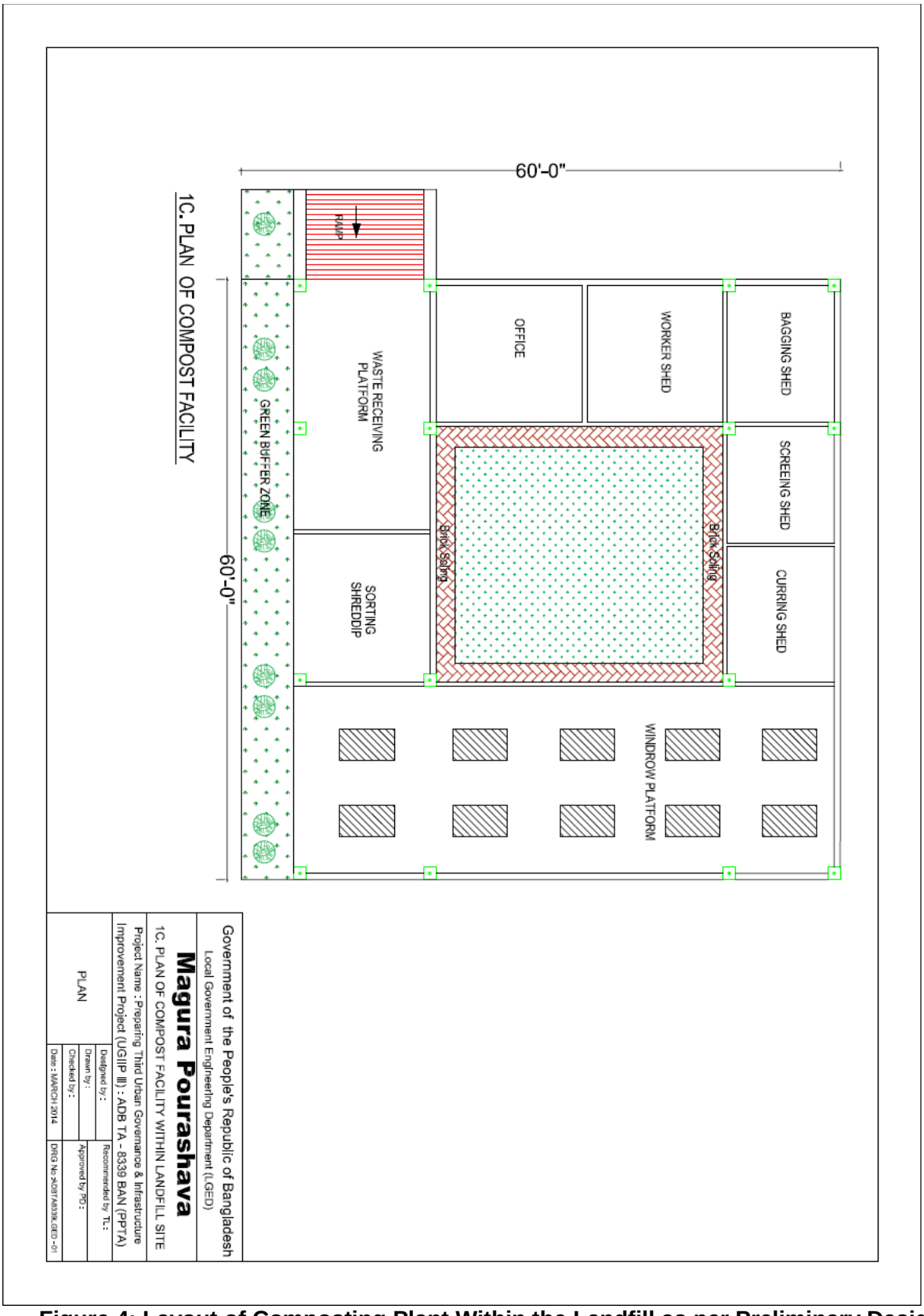


Figure 4: Layout of Composting Plant Within the Landfill as per Preliminary Design

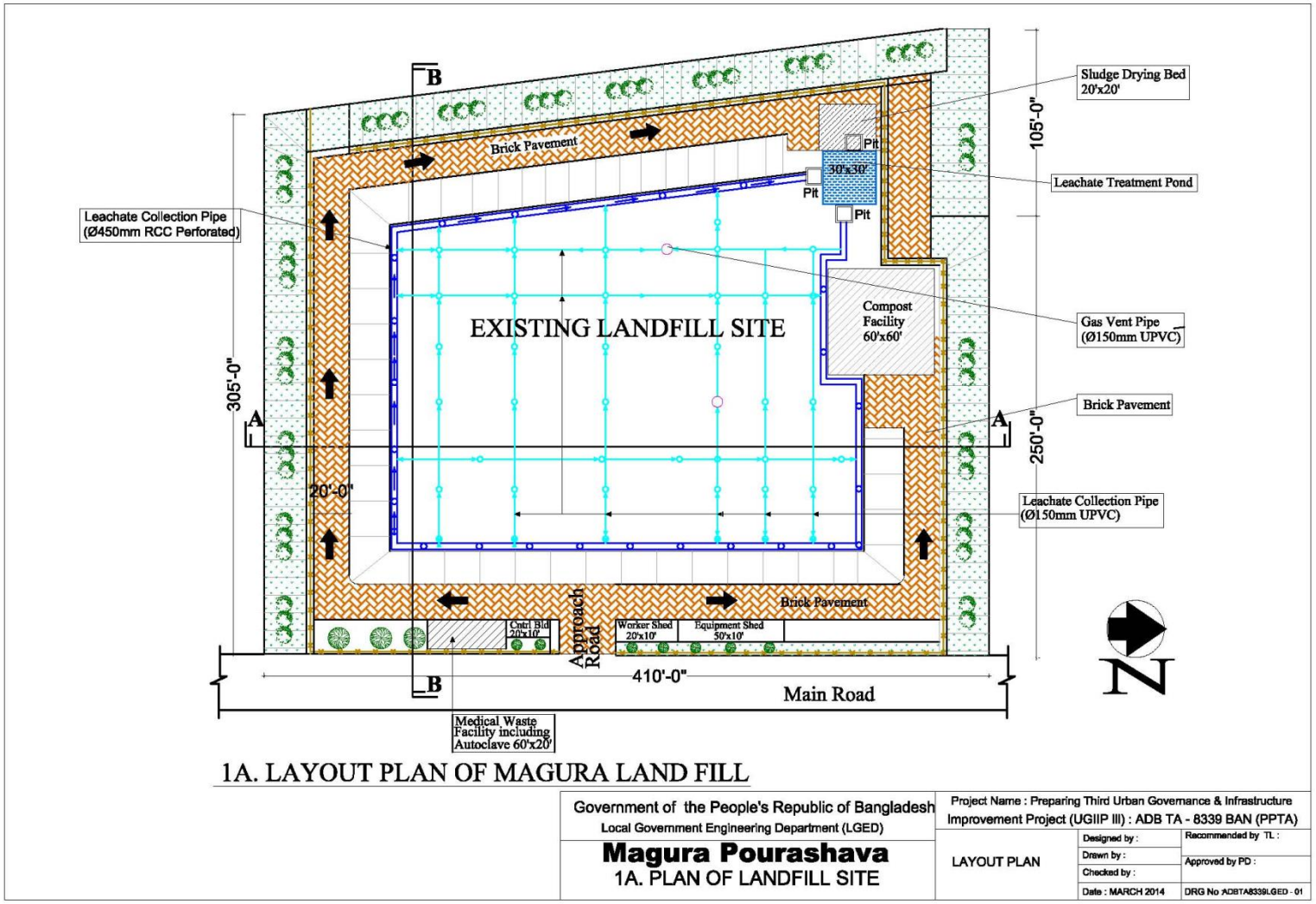


Figure 5: Layout of Controlled Landfill as per Preliminary Design

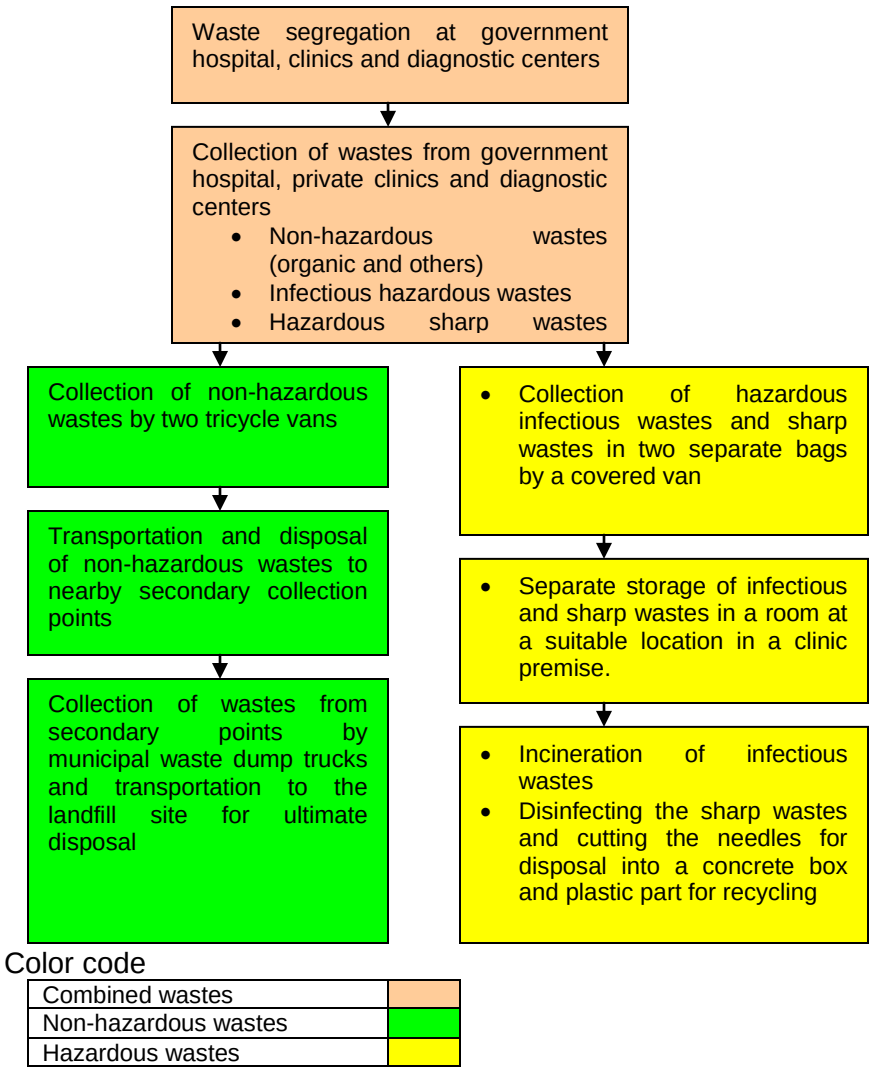


Figure 6: Schematic Model for Management of Medical Wastes in Magura Pourashava

IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for the Baseline Study

41. **Data collection and stakeholder consultations.** Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites. The literature survey broadly covered the following:

(i) subproject details, reports, maps, and other documents available with the ADB and PPTA consultants, LGED, and Magura*pourashava*;
(ii) relevant acts and extraordinary gazettes, and guidelines issued by Government of Bangladesh agencies; and
(iv) literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and environmental planning documents collected from Government of Bangladesh agencies and websites.

42. Several visits to the subproject sites were made during the project preparation stages to assess the existing environment (physical, biological, and socioeconomic) and gather information with regard to the proposed sites and scale of the proposed subproject. A separate socioeconomic study was conducted to determine the demographic information, archeological and religious places, densely populated pockets, and settlements.

43. **Data analysis and interpretation.** The data collected was analyzed and interpretations made to assess the physical, biological, and socioeconomic features of the project area. The relevant information is presented in the succeeding paragraphs.

44. **Updating during detailed design phase.** The IEE including specific description of the environment and corridor of impact will be updated as necessary based on the final design and locations.

B. Physical Characteristics

45. **Topography.** Magura topography is naturally plain. The elevation is 3 to 8 feet (ft.) above mean sea level. The core area is high and generally not flooded during monsoon season.

46. **Climatic conditions.** The climate in the *pourashava* area sultry during extended summer season, which covers from March to June. The mean maximum temperature is about 38 deg C, which is recorded in April with the maximum temperature varying from 32.2 to 42.2 deg C. During the cold season the lowest monthly temperature is varying from 4.4 to 21.1 deg C with the lowest temperature recorded as 3.5 deg C in the month of February. The annual mean rainfall of the *pourashava* is about 1,840 mm which is less than the national average of 2,286 mm. Rains occur from May and continues up to September during monsoon. In this period more than 70% of the rainfall is observed. The winter is more or less dry with few or rainfall.

47. **Surface water and other bodies of water.** The Nabaganga River enters the *pourashava* from the north-eastern corner and flowing for about for ten kilometers (km) through the *pourashava* area and exits through the eastern boundary of the *pourashava*. Another river the Muchikhali River, a tributary of the Nabaganga River entering from the west and flowing for about eight kmand again meets the Nabaganga River inside the *pourashava*.

48. There are large number of ponds, ditches, low lying agricultural lands as low pockets in Magura which act as retention basin to delay the maximum floods in the monsoon. However the PPTA study identified there are no existing natural or man-made bodies of water adjacent to the subproject sites. Any water bodies to be identified during detailed design phase will be assessed and reported in the updated IEE.

49. **Air quality.** As there are no major industries in Magura the main sources of air pollution are vehicles and non-point sources such as open burning. There are currently no air quality monitoring stations are in operation within the *pourashava* limit. The baseline air quality will be measured by the subproject contractors prior to commencement of work. The results will be provided in the updated IEE and all other measurements during implementation will be reported as part of EMP implementation.

50. Acoustic environment. Subproject components are in the built-up part of Magura, with residential, commercial, and institutional establishments. The volume of traffic that passes through these sections is not significant and traffic jams are not frequent. However vehicular

movement can be considered as major cause of noise pollution. The baseline noise level will be measured by the subproject contractors prior to commencement of work. The results will be provided in the updated IEE and all other measurements during implementation will be reported as part of EMP implementation.

C. Biological Characteristics

51. **Flora and fauna.** Subproject components are located in Magura urban area or in its immediate surroundings which were converted into urban use for years ago, and there is no natural habitat left at these sites. Animals and plants in the subproject area are those commonly found in urban and built-up areas. No endangered/protected species of either flora or fauna are found in the *pourashava* or its immediate surroundings.

52. **Protected areas.** There are no protected forests, wetlands, mangroves, or estuaries in or near the subproject area.

D. Socioeconomic Characteristics

53. **Area and population**. Magura *pourashava* occupies an area of 47.30 km^2 with population of 98,355 as per Bangladesh Bureau of Statistics (BBS) Census 2011. It is divided into 9 wards. The information about total number of households with average size and population of the *pourashava* is presented in Table 4.

Table 4: Population of Magura *Pourashava*

Administrative Unit	Area (km^2)	Households (nos.)	Total Population	Average Household Size	Density (per km^2)
Magura Pourashava	**47.30**	**22,105**	**98,355**	**4.45**	**2,079**
Ward No - 01	9.62	2,628	11,711	4.45	1,217
Ward No - 02	3.65	2,465	10,913	4.42	2,990
Ward No - 03	5.40	2,439	10,794	4.42	1,999
Ward No - 04	3.64	2,676	11,224	4.19	3,084
Ward No - 05	4.20	1,606	7,181	4.47	1,710
Ward No - 06	2.38	1,846	8,352	4.52	3,509
Ward No - 07	11.14	3,054	13,559	4.44	1,217
Ward No - 08	5.06	3,125	14,524	4.65	2,870
Ward No - 09	2.21	2,266	10,095	4.45	4,568

Source: BBS Community Report, Zilla: Magura, 2011

54. **Land use.** The study of the land use pattern is based on extensive physical survey which was accomplished through GPS system. Through the survey it has been accomplished that major land use goes under agricultural category which is about 60.01 % of the total land. The second major land use is residential and homesteads and occupying about 27.74% of the area. Beside these, water bodies occupy the third major about 5.36% of the total land. The presence of the two rivers and innumerable ponds and ditches present in the Pourashava area is the reason of high proportion of water bodies.

55. **Existing provisions for pedestrians and other forms of transport.** Magura has an aggregate 257 km road network. Observably, most of these roads have uneven-rough surface, damaged topping and pavement sides owing to lack of maintenance, mostly narrow in width, hence incapable of accommodating generated traffic, and exhaustively without road-side footpath. While visiting different roads, the team observed that the surfaces are worn out partly and in some cases entirely. Justifiably, they call for intervention varying from normal significant

maintenance to large improvement/reconstruction. The overall road condition of Magura *pourashava* is presented in Table 5. There are no street light facilities in the *pourashava*.

Table 5: Conditions of Roads in Magura *Pourashava*

Sl.	Road type	Length in km	Overall condition
1	Paved Road	122.35	35% in good condition
2	Brick-soled Road	50.0	50% good condition
3	HBB	35.45	60% in good condition
4	Earthen	49.45	60% in good condition
	Total	257.25	

Source: PPTA consultants.

56. Being on the Dhaka-Jessore-Khulna Highway, a huge number of buses and trucks move both ways, through Magura. The pourashava has a fairly large bus terminal. But over the years, there appears to have been very little attention paid to its repair, maintenance and management. This state has left the once-beautiful bus terminal in a dreadful state. There is no government-owned truck terminal in Magura. Currently, trucks are promiscuously parked for loading and unloading at different points of the pourashava, disrupting urban life.

57. **Drainage.** The Nabaganga River and the silted up Muchikhali, flowing through Magura *pourashava*, are the most important natural drainage system for the *pourashava* area. An aggregate 32.05 km of drains of different type and size means that the pourashava has about 0.72 km of drain per km^2. The present drainage system is concentrated in the core area only, not good and sufficient enough to release the drainage congestion and the water logging in the area. The present development of the town area including its drainage system has developed without any meticulous planning. Moreover the capacity of the present drains is not considered adequate in section to drain out generated runoff following intense rainfalls which is the obvious cause of water-logging in the *pourashava*.

58. The PPTA team has visited a large section of the *pourashava* core area after a rainfall and found many water-logged area. Drainage system in these areas were inadequate, hence could not properly ease such congestion. In some areas drains were found without any outfall and congestion caused by solid waste dumping and earth filling led to the virtual closure of the drains. The *pourashava* as well as the general people agreed that some of the drains were built without any outfall and improper gradient and proper checking of construction-time invert levels.

59. **Water supply**. Magura *pourashava* has a water supply system of 65.22 km long distribution networks using uPVC pipes of diameter between 50-200 mm[12], 10 production tube wells (PTWs)[13]. There is no water storage facility (overhead tank) and water is directly injected into the distribution systems. PPTA study reported that the eight PTWs on the average produce about 80-90 cubic meters (m^3) per day with a total average daily production of 5,650 m^3. PTWs are operated twice daily (6 to 10 AM and 12 to 6 PM) for an average of 10 hours. The depth of PTWs varies from 90 to 267 m. There are a total of 4,015 house connections, out of which 3,508 are active and 507 are disconnected. Of the total 3,508 active connections 3,424 are

[12]Under DPHE 37 DTWSP, 7 km of existing pipes (diameter 50 mm) will be replaced with 100 mm.

[13]There are altogether 10 PTWs in Magura pourashava which were installed over a long period of time. DPHE installed 3 PTWs (01, 02 and 03) during the period 1982 to 1987 and other 4 PTWs (06, 07, 08, and 09) in 2006 to 2010. Additional 2 PTWs (04 and 05) were installed in 1999 by the Dutch-funded 18 District Towns Water Supply Project (DTWSP) implemented by DPHE. Recently, after the initiation of the 37 DTWSP, a new PTW (10) is under progress of installation. The construction of well has been completed; the pump-motor set and other accessories are in the process of installation.

domestic/residential and 84 are commercial/non-residential. None of the service connections has water meter.

60. The Pourashava Water Supply Section (PWSS) does not have any water quality data and no water quality sampling or testing is done. The water quality of PTWs in Magura pourashava was analyzed under the 37 District Towns Water Supply Project (DTWSP) being implemented by DPHE. The results are provided in Table 6.

Table 6: Water Quality Data (Samples Tested by 37DTWSP)

Sl No.	PTW	Location	pH	Fe (mg/l)	As (mg/l)	Manganese (mg/l)
1	01	Near Judge Court	7.3	5.42	0.001	0.045
2	02	Near PWD Office	7.3	1.09	0.030	0.000
3	03	Adarsha College Attached	7.5	1.03	0.020	0.000
4	04	Vaina Mor Poura Park	7.4	3.15	0.001	0.045
5	11	Parnandualy High School Attached	7.4	2.58	0.020	0.000
Bangladesh Standard-1997			**6.5~8.5**	**0.3~1.0**	**0.05**	**0.10**

Source: 37 DTWSP Feasibility Report, Magura, DPHE

61. **Solid waste management.** The pourashava generates approximately 34 tons of waste per day with a generation rate of about 0.25 kg/cap/day. There are 40 fixed dustbins located in different parts of the town along with 30/40 temporary secondary disposal points. At present, the pourashava has 2 open trucks for waste collection and 10 rickshaw vans. Collected wastes is being disposed in the *pourashava*'s 3.10 acre (1.25 hectares) dumping site or in instances requested by private land owners, dumped in low-lying areas to increase the land levels. The *pourashava* conservancy section has 3 permanent supervisory staff (1 conservancy inspector and 2 conservancy supervisors). They have a good monitoring system (attendance records) to supervise the activities of 138 daily basis cleaner (8 drain cleaners, 8 truck cleaners, 10 van operators and helpers), 101 road sweepers and 2 truck drivers. The waste collection rate is 45%.

62. Households, commercial, institutional wastes and others are piled up in the secondary storage points. The pourashava collects waste from these designated points. Beside this, wastes from markets, institutions etc. are also collected by the pourashava. Informal sector is prominent in recyclable collection and recycling. Rag-pickers and ferrywalas collect recyclable materials from roadside bins or from the households and sell it to buyers.

63. Hospital wastes are collected separately by two collection vans deployed by the Clinic Owners' Association. The infectious wastes are burnt in the clinic premises; and the other wastes are collected and disposed into municipal bins for collection by the *pourashava*.

64. There is no regular public awareness and public relation activities in the *pourashava*. Community involvement in waste collection had been started in two wards under DPHE's 18 District Water Supply and Sanitation Project. However the program was discontinued after the project period.

65. **Sanitation.** The sanitary condition in Magura *pourashava* is relatively poor. As per BBS 2011 (Population and Housing Census, Khulna Division - Urban), about 52.4% of the latrines are sanitary water sealed, 29.8% latrines are sanitary non-water sealed, 17.3% latrines are non-sanitary and 0.5% have no toilets. No disposal and treatment facility are available inside the *pourashava*. No sewerage system is available.

66. Field visits during the project preparation revealed septic tanks or the pits are occasionally emptied manually by sweepers when those are full or become non-operational to some extent. The collection and disposal practice of fecal sludge is very unhygienic due to disposal of sludge in low lands or in drains near the neighborhood which is unhealthy and source of pollution of the nearby environment including the water bodies.

Figure 8: Existing Sanitation (Public Toilets) in Magura

67. **Other existing amenities for community welfare.** The *pourashava* appears to grow with an unplanned development. Major installations, commercial and residential areas grow along the main highway and roads in the *pourashava*. The town has a literacy rate of 51%. It has educational institutions: 30 primary schools, 12 high schools, 4 colleges and 1 vocational training institute; health facilities: 1 100-bed government hospital, 21 private clinics, 1 TB clinic, 1 eye hospital, and 1 pediatric hospital; entertainment and recreational facilities: 1 stadium, 1 park and 1 cinema hall.

68. Despite having a sizeable population of nearly 100,000, Magura does not have its own auditorium/community center. Going with the common societal practices, community halls these days play a significant role in conducting social events like wedding, different parties, conferences and musical soiree.

69. There are no slaughterhouses in Magura *pourashava*. Therefore, animals are slaughtered in different places.

70. There are a total of 6 kitchen markets of different sizes in Magura *pourashava*. It was evident from the visits during project preparation that that most of the structure were very temporary, do not provide shelter from sun and shower and mostly do not have drains for disposal of market-stemmed wastewater. The roofs are in damaged conditions with exposed reinforcement in rusted condition, displaying apparent loss of structural strength. It was also observed that the kitchen market areas, where more sellers and buyers convene on specific *haat* days, cleanliness is not observed at all. The markets also lack in adequate number of dustbins for solid waste and has no arrangement for daily solid waste collection.

E. Historical, Cultural and Archaeological Characteristics

71. Important historical and cultural sites in Magura *pourashava* includes *ghat* of Nader Chand, tomb of Pir Mokerram Ali, tomb of Garib Shah, remnants of the Rajbari of Raja Sitaram Roy, Rajbari of Raja Satrujit Roy, fortification of Debal Raja, remnants of the Rajbari of Birat

Raja at Sreepur, Mosque at village Gopal (Mughal period), Siddheshwari Math at Athara Khada and Ashram of Nangta Baba (Satdoha Ashram).

72. The proposed controlled disposal site are not within nor adjacent to these sites.

V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS

A. Methodology

73. Issues for consideration have been raised by the following means: (i) input from interested and affected parties; (ii) desktop research of information relevant to the proposed subproject; (iii) site visits; and (iv) evaluation of proposed design scope as per PPTA study and potential impacts.

74. The area of impacts considered are: (i) existing dumpsite adjacent to Magura-Jessore Highway some 3km away from the *pourashava*; (iii) site of the composting plant at the landfill site, and (iv) immediate surroundings of the landfill site facilities (30 m circumference). Categorization of the subproject and formulation of mitigation measures have been guided by ADB's REA Checklist for solid waste management (Appendix 1) and ADB SPS, 2009.

B. Screening out Areas of No Significant Impact

75. From the preliminary design and results of the rapid environmental assessment, it is clear that implementation of Magura solid waste management subject will not have major negative impacts because activities will be localized/site-specific and short in duration. Moreover, the area of impact of the subproject will be on existing sites, vacant lands, and immediate surroundings, and construction will be conducted within a relatively small area. Because of these there are several aspects of the environment that are not expected to be affected by the subproject (Table 6) and thus can be screened out of the assessment at this stage but will be assessed again during detailed design stage and before implementation.

Table 7: Fields in Which the Subproject Is Not expected to have Significant Impacts

Field	Rationale
A. Physical Characteristics	
Topography, landforms, geology and soils	Required amount of materials will not cause alteration of topography, landforms, geology and soils. Erosion hazard is insignificant as trenching and excavation works will be conducted only during construction stage (short-term) and specific to sites along public ROWs.
Climatic conditions	Short-term production of dust is the only effect on atmosphere. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
B. Biological Characteristics	
Biodiversity	Activities being located in the built-up area of Magura pourashava will not cause direct impact on biodiversity values. The construction activities do not anticipate any cutting of trees.
C. Socioeconomic Characteristics	
Land use	No alteration on land use. Rehabilitation of existing Solid Waste Management is prioritized over new construction, using vacant government land and right of way (ROW).
Type of community spread	No alteration on type of community spread.
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area.

Field	Rationale
	There are well developed methods for mitigation.
Socio-economic status	Subproject components will be located in government land and existing ROWs thus there is no requirement for land acquisition or any resettlements. Manpower will be required during the 18-month construction stage. This can result in generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Magura*pourashava* where there are a variety of human activities, will result in impacts to the sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration.
D. Historical, Cultural, and Archaeological Characteristics	
Physical and cultural heritage	There are no scheduled or unscheduled historical, archaeological, pale-ontological, or architectural sites of heritage significance listed by local and/or national authority and/or internationally (UNESCO) within or adjacent to subproject sites.

C. Anticipated Impacts and Mitigation Measures – Planning and Design Phase

20. **Subproject selection criteria.** The project environmental assessment and review framework specifies environmental criteria to avoid or minimize adverse impacts during the identification and finalization of drainage subprojects. Table 8 summarizes site and design considerations as per preliminary design.

Table 8: Site and Design Considerations to Meet EARF Environmental Criteria

	Components	Environmental Selection Guidelines	Remarks
1.	Overall selection guideline	i. Comply with all requirements of relevant national and local laws, rules, and guidelines.	- Requisite LCC and ECC to be obtained prior to commencement of works
		ii. Avoid/minimize where possible locations in protected areas, including notified reserved forests or biodiversity conservation hotspots (wetlands, national reserves, forest reserves, and sanctuaries).	- Not present in Lalmonirhat *pourashava*
		iii. Avoid possible locations that will result in destruction/disturbance to historical and cultural places/values.	-- Use of “chance find” procedures in the EMP that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.
		iv. Avoid tree-cutting where possible. Retain mature roadside trees which are important/valuable or historically significant. If any trees have to be removed, plant two new trees for every one that is lost.	- No trees in the site
		v. Ensure all planning and design interventions and decisions are made in consultation with local communities and include women. Reflect inputs from public consultation and disclosure for site selection.	-- All consultations during project preparation are documented and concerns expressed by public addressed in the IEE.
		vi. Synchronize all road improvement and pipe laying works (to extent possible) to minimize disturbance and optimize use of resources (e.g., water pipes laid prior to road improvements).	-Not applicable

	Components	Environmental Selection Guidelines	Remarks
	Solid waste management	i. Ensure small (secondary) transfer stations are not located within 30 m of residences, schools, places of worship (such as churches, temples or mosques), and historical and cultural places.	Not included in the subproject
		ii. Ensure all new landfills and secondary transfer stations are not constructed in areas where the groundwater table is less than 2 meters below ground level.	Not applicable. Subproject will involve rehabilitation and upgrade of existing dumpsite.
		iii. Locate all new landfills at least 250 m from habitation, sensitive receptors, shops, or any other premises used by people, thus establishing a buffer zone to reduce the effects of noise and dust and the visual appearance of the site.	Subproject will involve rehabilitation and upgrade of existing dumpsite. The site is 3.0 km from the core urban area. There are no habitation, sensitive receptors, and/or shops within or adjacent to the site.
		iv. Locate all new facilities/buildings at sites where there is low risk of flooding or other hazards that might impair functioning of, or present a risk of damage to the facilities, or their environs.	Flood statistics data of the project area will be reviewed during detailed design phase. Flood protection measures will be incorporated in the design.
		v. Ensure no new landfills are constructed within or near water supply wells, and at least 500 m of any groundwater wells.	There are no sources of water supply (tube wells) within 50 meters of the landfill site.
		vi. Ensure a buffer zone is provided around the landfill with the distance agreed upon with the regulatory agencies	Included in the subproject design.
		vii. Ensure designs and operations of new landfills are done as per norms of modern sanitary facilities and to include all essential elements necessary to prevent environmental pollution and to ensure safe handling of waste during construction and operation.	Preliminary design of the controlled landfill includes liner system to prevent leachate, leachate collection system and control facility, gas collection system, final cover system, surface water drainage system, environmental monitoring system for air, water, soil, odour, and gas. Operations and maintenance manual (O&M) will include closure and post-closure plan.
		viii. For medical waste treatment facilities comply with Medical Waste Rules, 2008	Design considerations included requirements of Medical Waste Rules, 2008
		ix. Locate new medical waste treatment facility at least 50 m away from nearest habitation.	Not applicable.
		x. Ensure a separate receiving and sorting area for medical wastes	Included in the preliminary design.
		xi. Provide back-up power source for medical treatment facility to ensure uninterrupted operations	Included in the preliminary design.

21. **Land acquisition and resettlement.** The existing dumping site is owned by Magura *pourashava*. Any land acquisition and involuntary resettlement impacts will be addressed in the RPs prepared as per requirements of ADB SPS and Government of Bangladesh rules and regulations.

22. Cutting of trees will not be required as per preliminary design. This will be reassessed during detailed design stage and if cutting of trees will be required, compensatory plantation for trees lost at a rate of 2 trees for every tree cut will be implemented by the contractor, who will also maintain the saplings for the duration of his contract.

76. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. Locations and siting of the proposed infrastructures were considered to further reduce impacts. The subproject will be in properties held by the *pourashava* and access to the subproject sites is through public ROW and existing roads hence, land acquisition and encroachment on private property will not occur.

77. The concepts considered in design of the Magura solid waste management subject are: (i) locating facilities on lands owned by the government/Pourashava to avoid the need for land acquisition and relocation of people;(ii) taking all possible measures in design and selection of site to avoid resettlement impacts; (iii) avoiding where possible locations that will result in destruction/disturbance to historical and cultural places/values; (iv) avoiding tree-cutting where possible; (v) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosure for site selection.

78. Preliminary designs integrate a number of measures, both structural and non-structural into the Magura solid waste management subject, including: (i) design life of 10 years; and (ii) base level of 1st floor raised by 200 mm to avoid water-logging and inundation during monsoon season. The landfill site facilities and other solid waste management components will be designed in accordance with the relevant national and international policy/rules/regulations for solid waste management and environmental health enhancements.

39. The following design considerations are included in the preliminary design of the autoclave for medical waste treatment.

(i) Single-chamber incinerators (locally-produced burning units similar to brick kilns) will not be considered as alternative technology.
(ii) Locate the autoclave in the proposed landfill site to meet locational requirements of DOE.
(iii) Include in the design size reduction units appropriate for the treated medical wastes (including but not limited to mechanical shredders).
(iv) Allocate in the proposed landfill site an enclosed area with minimum size of 20 feet x 30 feet for the autoclave. Additional minimal area may be required for the size reduction units and sorting room, as generally required by DOE in its previous issuances of ECCs in similar facilities.
(v) Provide back-up power source to ensure uninterrupted operations of the autoclave.
Include in the proposed landfill site a separate cell for treated medical wastes.
(vi) Implement strictly segregation at source. The Magura *pourashava* will need to work closely with the clinic owners association and government hospitals.
(vii) Include waste criteria conditions in the O&M manual (to be developed by contractor) and ensure only medical wastes appropriate for treatment are included.
(viii) Include workers health and safety measures in the O&M manual.
(ix) The steam discharge from the autoclave shall be run through small effluent treatment plant (ETP), therefore the steam which will convert to effluent upon contact with ambient air will be treated prior to discharge. The effluent shall be monitored by DOE as part of the Environmental Management Plan.
(x) Include measures in the O&M manual to control pungent odor and uncharacterized air emission which are commonly observed in operating autoclaves. These measures include, but not limited to, not opening the autoclave door until such

time it is deemed to be opened safely and the odor has been dissipated. This procedure will also ensure workers protection from exposure to extreme temperature and scalding from steam. The specific time and conditions shall be set by the contractor during the commissioning of the autoclave and reflected in the O&M manual to be turned over to Magura pourashava and operators.

(xi) The autoclave shall be commissioned by the contractor for at least 2 years or as specified in his contract under the project. During this period the contractor shall provide training to identified Magura pourashava staff and/or operators.

(xii) Ensure sustainability of operations by considering various options as practiced in Bangladesh such as considering, but not limited to public-private partnerships, NGO-led operation, or tie-up with operators of landfill site.

D. Anticipated Impacts and Mitigation Measures – Construction Phase

79. In the case of this subproject (i) most of the individual elements are relatively small and involve straightforward construction, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements; and (iii) being located in the built-up area of the *pourashavas*, will not cause direct impact on biodiversity values.

80. **Construction method.** Trenches will be dug by backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed nearby, and the materials (brought to site on trucks and stored on unused land nearby) will be placed in the trench by crane or using a small rig. The infrastructures will be constructed manually according to design specifications. Any excavated road will be reinstated.

81. Under the SWM subproject the civil construction works are for controlled landfill site development including controlled building, worker shed, heavy equipment shed, compost facility, leachate treatment pond, waste unloading area, leachate collection pond and embankment around the landfill site. The controlled building, worker shed, and heavy equipment shed all will be of tin-shed supported by iron/wooden truss, brick walls and brick/RCC foundation. Other than the heavy equipment shed all will have CC (Cement Concrete) floor and brick/RCC foundation. The heavy equipment shed will be of RCC (Reinforced Cement Concrete) floor. These structures will be built on the existing waste dumping site and the foundation and base construction works involve removal of the existing decomposed wastes to a required depth, filling it with construction debris and soils, compacting layer-by-layer to make the base of the rooms strong enough to support loads. For the waste unloading area and down-ramp there will be RCC works of top surface and the underneath is sand filling with side slope protection works. Except the front side, which is the highway, three sides of the area will be enclosed with an earthen embankment. The soils required for the construction of the embankment will be imported from other areas. Alternatively, the soils can be taken by making borrow pits in the area inside the embankment subject to the soil investigation; this will increase the waste loading capacity and so the lifespan of the landfill site. The compost plant area will be of CC floor and tin-shed without any surrounding wall to encourage free flow of air/oxygen for promotion of aerobic digestion of composting. The area of the plant will be formed with earth-filling along with side slope protection works for the earth filling works. The leachate pond will be constructed of digging earth subject to the geological investigation of the area (in case there is a natural impermeable soil layer for groundwater protection and groundwater depth is much high). For artificial liner at the base and groundwater depth is low, the pond will be made of RCC works and in this regard a special type of high density concrete will be required to use.

82. Also there will be two rooms (one for recyclable material storage and sorting, and the other for hazardous medical waste storage and putting an incinerator). These two rooms will have tin-sheds, CC floor, brick walls, and brick/RCC foundation.

83. There is sufficient space for a staging area, construction equipment, and stockpiling of materials. However, the contractor will need to remove all construction and demolition wastes on a daily basis.

84. Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the project sites in built-up areas of Magura where there are a variety of human activities, will result in impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are short-term, site-specific and within a relatively small area. There are no impacts that are significant or complex in nature, or that need an in-depth study to assess the impact. Thus, Magura solid waste management subject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with construction activities can be mitigated to acceptable levels with the following mitigation measures (Table 8).

Table 8: Anticipated Impacts and Mitigation Measures – Construction Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Topography, landforms, geology and soils	On a cumulative effect of all types of subprojects in the Pourashava, a significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may cause localized changes in topography and landforms. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Utilize readily available sources of materials. If contractor procures materials from existing burrow pits and quarries, ensure these conform to all relevant regulatory requirements. • Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Prepare and implement a spoils management plan (Appendix 3). • Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Magura local authority on designated disposal areas. • All earthworks must be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. • Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any Solid Waste Management leading to water bodies. • Take all precautions to minimize the wastage of water in the construction activities. • Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the Solid Waste Management leading to the water bodies. • Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low

Field	Impacts	Mitigation Measures
		lying areas. • While working across or close to any water body, the flow of water must not be obstructed. Ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of any watercourse and cross Solid Waste Management channels. • Monitor water quality according to the environmental management plan.
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; • Use tarpaulins to cover soils, sand and other loose material when transported by trucks. • Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. • Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). • Monitor air quality.
Acoustic environment	Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. • Plan activities in consultation with Magura local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. • Use of high noise generating equipment shall be stopped during night time. • Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; • Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. • All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). • Monitor noise levels. Maintain maximum noise levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. • If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. • Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
Aesthetics	The construction activities do not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers,	• Prepare the Debris Disposal Plan • Remove all construction and demolition wastes on a daily basis. • Coordinate with Magura local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas Avoid stockpiling of any excess spoils • Suitably dispose of collected materials from Solid Waste Managements, unutilized materials and debris either

Field	Impacts	Mitigation Measures
	spoils, oils, lubricants, and other similar items. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	through filling up of pits/wasteland or at pre-designated disposal locations. • All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. • Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. • In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. • The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
B. Biological Characteristics		
Biodiversity	Activities being located in the built-up area of Magura pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. There are no trees at the site that need to be removed.	• Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. • All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. • Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. • Prohibit employees from poaching wildlife and cutting of trees for firewood.
C. Socioeconomic Characteristics		
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject will follow existing ROW alignment. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Prepare and implement a Traffic Management Plan (Appendix 4) • Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. • Maintain safe passage for vehicles and pedestrians throughout the construction period. • Schedule truck deliveries of construction materials during periods of low traffic volume. • Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. • Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. • Leave spaces for access between mounds of soil. • Provide walkways and metal sheets where required to maintain access across for people and vehicles. • Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. • Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there

Field	Impacts	Mitigation Measures
		is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Socio-economic status	Subproject components will be located in government land and existing ROWs thus there is no requirement for land acquisition or any resettlements. Manpower will be required during the 18-month construction stage. This can result in generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.	• Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. • Secure construction materials from local market.
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Magura *pourashava* where there are a variety of human activities, will result to impacts to the sensitive receptors such as residents, businesses, and the community in general. Excavation may also damage existing infrastructure (such as water distribution pipes, electricity pylons, etc.) located alongside the roads. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Provide safety signage at all sites visible to public • Provide safety barriers near any trenches, and cover trenches with planks during non-work hours. • Obtain details from *pourashava* nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; • Integrate construction of the various infrastructure subprojects to be conducted in Magura (roads, water supply, etc.) so that different infrastructure is located on opposite sides of the road where feasible and roads and inhabitants are not subjected to repeated disturbance by construction in the same area at different times for different purposes. • Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. • Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. • Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. • If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Provide safety signage at all sites visible to public • Provide safety barriers near any trenches, and cover trenches with planks during non-work hours. • Contractor's activities and movement of staff will be restricted to designated construction areas. • Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. • Consult with Lalmonirhat local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. • If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner.

Field	Impacts	Mitigation Measures
		• Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.[14] • Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. • Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. • A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. • Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. • The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.
Workers health and safety	There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. • Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. • Produce and implement a site health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training[15] for all

[14] These products come in powder forms, and once mixed with water (being the catalyst) simply expand, and crack the rock from hole to hole. This product is environmentally friendly and can be washed away after it has been used.

[15] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring

Field	Impacts	Mitigation Measures
		site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. • Provide medical insurance coverage for workers; • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Ensure moving equipment is outfitted with audible back-up alarms; • Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and • Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
D. Historical, Cultural, and Archaeological Characteristics		
Physical and cultural heritage	Construction works will be on built-up areas of Magura thus risk for chance finds is low.	• All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. • Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. • Stop work immediately to allow further investigation if any finds are suspected.

arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

E. Anticipated Impacts and Mitigation Measures – Operations and Maintenance (O&M) Phase

85. For the first 2 years of operations of the pilot scheme, the Nagorik committee will manage the solid waste management in the pilot area. The committee, as supervised by Magura *pourashava* and assisted by the consultant teams will develop a community-based operations manual to be used in expanding the pilot scheme.

86. The contractor will manage for 2 years the operations and maintenance (O&M)[16] of the composting plant and controlled disposal site, or through a sub-contractor. The contractor, in consultation with Magura *pourashava*, will also develop an O&M manual for the regular and preventive maintenance of the facilities.

87. **Land contamination.** The composting plant, autoclave room, sorting room/staging area, and controlled disposal site will not contaminate the lands the way other industrial operations can. The main reason for this is that all facilities will have cemented flooring while the controlled disposal site will have special impermeable layers underneath (in case such protection is not naturally there artificial impermeable layer will be constructed.)

88. **Generation of waste materials and by-products.** In general, pollutants generated from the facilities include: wastewater from toilet and cleaning of premises, improper storage of delivered wastes and end-products, and leachate from the solid waste. The contractor will be required to keep the ancillary sites of the transfer composting plants, and controlled disposal site clean, tidy and orderly condition free of litter, waste material (whether solid or liquid) and debris. The contractor will also be responsible for the maintenance of the approach road (Magura-Jessore Highway)in consultation with RHD to the controlled landfill (if damaged by his/her works) and to keep it free from litter.

89. **Generation of wastewater and water contamination.** The liquid wastes from the facilities are high in biological oxygen demand. The quantity of leachate may also be huge during especially in the rainy seasons. The wastes from the facilities can end up in water bodies, polluting water resources. Although the contaminants are non-toxic in nature, they can introduce bacterial contamination and increase nitrates, phosphates and sulfates concentration in water, leading to health problems. Special drains will be constructed to allow wastewater from the transfer stations and composting plants to be diverted away from water wells and adjacent properties. Leachate generated from the controlled landfill will be channeled to a leachate collection pond and will be allowed to evaporate. Remaining leachate will be re-circulated as part of daily maintenance of waste covers.

90. **Odor.** The facilities will always give a particular stink due to decomposition of wastes. Excessive odor is a nuisance to locals and attracts pests and vermin.

91. **Noise.** Major sources of noise are the chaos created by the laborers working in the facilities and heavy vehicular movement to during collection and transport of wastes.

[16] Maintenance activities will include replacement of equipment and consumables, and also horticultural maintenance and repairs to equipment, pavements and other civil works which are part of the CLF.

92. **Health, hygiene, and safety.** Spread of diseases to workers and their families may occur due to inadequate provision of safety equipment and lack of practice of safety rules and precautions. Sufficient, safe, potable and constant supply of fresh water will be made available at adequate pressure throughout the premises of the composting plant and controlled landfill. Suitable facilities for washing of hands and nail brushes should be there, soap or detergent will be provided for the workers. All sanitary facilities will be equipped with suitable flushing appliance.

93. When the controlled landfill begins to function, it is expected to provide a modern sanitary facility for the workers and staff as well as systematic handling, transportation and disposal of solid waste without causing environmental pollution. Providing this occurs there should be few negative environmental impacts and there are several fields that should be unaffected. These are identified in Table 4 below, with an explanation of the reasoning in each case. These factors are thus screened out of the impact assessment and will not be mentioned further.

94. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 9).

Table 9: Anticipated Impacts and Mitigation Measures – O&M Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Water quality	Run-off from stockpiled wastes and end-products of composting which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Take all precautions to prevent entering of run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the channels leading to the water bodies. • Remove all wastes, by-, and end-products immediately. • Monitor discharge of leachate including review of ECC conditions. Parameters to be monitored include suspended solids, dissolved solids (inorganic), pH, ammoniac nitrogen (as N), total nitrogen (as N), biochemical and chemical oxygen demand, arsenic mercury, lead, cadmium, total chromium, copper, zinc, nickel, cyanide, chloride, fluoride, phonemic compounds and others as per ECR, 1997. • Monitor compost quality. Visual inspection to ensure that glass, plastic and other physical inerts and fragments are absent in compost and it has no offensive smell. Also testing of compost to meet standards for arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, pH and other parameters as prescribed by the relevant National policy of the Government. • Monitor treated wastes quality as per Medical Wastes Rules and conditions of the ECC. Tests at the minimum includes measurement of temperature, pressure, contact time, spore tests, and other routine tests (visual).
Air quality	Moving wastes, by- and end-products (such as composts) may create dusts during dry season. Landfill gas generation. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Use bin covers and/or tarpaulins during transport of wastes, by-, and end products (compost) • Use tarpaulin to cover soils, sand and other loose material that will be used in the controlled landfill. • Green belt will be developed around the facilities to act as a barrier for dust pollution. • Only inert waste will be sent to controlled landfill so that landfill gas formation is minimum.
Acoustic environment	Increase in noise level due to presence of workers and	• Plan activities in consultation with Magura *pourashava* so that activities with the greatest potential to generate noise

Field	Impacts	Mitigation Measures
	movement of vehicles. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	are conducted during periods of the day which will result in least disturbance.
B. Biological Characteristics		
Biodiversity	Activities in the built-up area of Magura *pourashava*. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	• No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal). • Monitor survival rate of vegetation (plants and trees) in the green belt of the facilities.
C. Socioeconomic Characteristics		
Existing provisions for pedestrians and other forms of transport	Increase in traffic in the *pourashava* during collection, loading and unloading of wastes. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Early hour collection will be enforced before the peak traffic hours. • Maintain safe passage for vehicles and pedestrians. • Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. • Notify affected sensitive receptors by providing sign boards and contact numbers for concerns/complaints. • Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. • Consult businesses and institutions regarding operating hours and factoring this in work schedules. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Workers health and safety	Workers need to be mindful of the occupational hazards working in waste management facilities. Potential impacts are negative and long-term but reversible by mitigation measures.	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. • Ensure that all site personnel have a basic level of H&S training. • Produce and implement a O&M health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training[17] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of

[17] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

Field	Impacts	Mitigation Measures
		work at the site, personal protective protection, and preventing injuring to fellow workers; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. • Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
Community health and safety	Possible accumulation of waste causing health problems for community. Pests and vermin. Potential impacts are negative and long-term but reversible by mitigation measures.	• Wet/biodegradable wastes will be emptied directly from the bins to primary collection vehicles daily and dry/non-biodegradable wastes once in a week. The number and type of bins and vehicles to be procured under the project is sufficient to ensure no accumulation of wastes in the community. • Wastes will be collected regularly to prevent pests and vermin.

F. Cumulative Impact Assessment

95. The cumulative impact assessment examined the interaction between the subproject's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing, and reasonably foreseeable future projects or activities. The interaction of residual effects associated with multiple projects and/or activities can result in cumulative impacts, both positive and negative. The project's potential cumulative effects were considered with respect to valued components in environmental and socioeconomic categories, in four areas:

(i) of any potential residual project effects that may occur incrementally over time;
(ii) consideration of other known relevant projects or activities within the specified study area boundaries, even if not directly related to the project;
(iii) potential overlapping impacts that may occur due to other developments, even if not directly related to the proposed subproject; and
(iv) future developments that are reasonably foreseeable and sufficiently certain to proceed.

96. The project has identified the valued components as water quality, air quality, acoustic environment, socioeconomic and socio-community components, and human health and safety. There are no foreseeable projects that will overlap with the subproject. The spatial boundary of the subproject are the areas where the facilities (transfer stations, composting plant, and controlled landfill) is located. The temporal boundary can be considered as the whole Magura *pourashava*.

97. The infrastructures will be (i) designed to the current best practice standard and in line with the current LGED guidelines[18] for a 10-year design period; (ii) built that the floods do not damage them; and (iii) drains of the facilities are to be kept free from wastes and siltation.

[18] Urban Solid Waste Management Manual, May 1998

98. **Water quality.** Due to nature of the subproject there is risk of contaminating groundwater and nearby bodies of water during O&M phase. However the infrastructures have been designed ensuring impermeability of surfaces by having concrete surfaces for the transfer stations and composting plant while HDPE/clay liners for the controlled landfill. Drains within the facilities will also ensure wastewater generated during operations will be diverted away from any channel leading to agricultural lands, water bodies, and water sources/tube wells. Short-term negative impacts are possible but can be mitigated through design and implementation of EMP. Potential residual effects is considered to be negligible.

99. **Air quality.** Emissions of common air contaminants and fugitive dust may be elevated in proximity to active work sites during construction and O&M phases; these impacts will be short-term and localized to the immediate vicinity of controlled landfill site. Greenhouse gas (GHG) emissions may increase as a result of the subproject activities (i.e., vehicle and equipment operation, concrete production, disposal of excavated material, land-filling of residual wastes). Given the subproject's relatively minor contribution to common air contaminants and GHG emissions during construction, the overall significance rating of both these potential residual effects is considered to be negligible.

100. **Acoustic environment.** Noise levels during construction and O&M activities in immediate proximity of work sites are expected to increase. The duration of exposure will be relatively brief and imperceptible. The exposure represents a temporary, localized, adverse residual effect of low significance for affected receptors. While building damage due to ground vibrations is unlikely, there may be annoyance to spatially located receptors during construction and O&M activities. The overall significance rating of potential residual effects is considered to be negligible.

101. **Socioeconomic and socio-community.** Concerns on existing provisions for pedestrians, other forms of transport, and over-all impact on livability particularly nearby the transfer stations and composting plant will occur spatially during construction and O&M activities. Traffic movement will be improved once the construction activities are completed. Since the subproject involves small-scale facilities, it will not conflict with existing or planned land use. O&M manuals for the facilities, comprehensive capacity building, and community involvement to be provided under UGIIP-3 will ensure efficient operation of the facilities and acceptability by the stakeholders. However, following improvement in infrastructures and services, added residential developments, commercial, and business facilities and increased densities are expected to develop and enhance Magura*pourashava*. This can be considered a long-term cumulative benefit of the subproject.

102. Given the scale of the project it is likely that a number of local people will obtain at least temporary socio-economic benefits, by gaining employment in the construction workforce, and thus raising their levels of income. In addition, a significant amount of employments will be generated associated with the O&M of the facilities to be developed under the subprojects. These benefits can bring wider social gains if they are directed at vulnerable[19] groups.

103. **Community and workers health and safety.** No adverse residual effects to human health will occur as a result of construction or O&M activities, and mitigation measures are in

[19] Vulnerable groups as those without legal title to land and other assets; households headed by single earner females, the elderly or disabled; indigenous peoples (based on ADB OM); and households with incomes that are below the poverty line.

place to ensure public and worker safety, and will be closely monitored. While exposure to elevated noise levels, fugitive dust and common air pollutants will occur in proximity to work sites, due to their short-term and localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health.

104. Upon completion of the subproject, the socio-community will be the major beneficiaries of this subproject. With the improved solid waste management facilities, additional vehicles and workers PPE, they will be provided with reliable and climate-resilient municipal services. In addition to improved environmental conditions, the subproject will reduce occurrence of diseases and people would spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health. These are considered a long-term cumulative benefit.

105. Therefore the project will benefit the general public by contributing to the long-term improvement of municipal services and community livability in Magura *pourashava*.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Public Consultation Conducted

106. The public participation process included (i) identifying interested and affected parties (stakeholders); (ii) informing and providing the stakeholders with sufficient background and technical information regarding the proposed development; (iii) creating opportunities and mechanisms whereby they can participate and raise their viewpoints (issues, comments, and concerns) with regard to the proposed development; (iv) giving the stakeholders feedback on process findings and recommendations; and (v) ensuring compliance to process requirements with regards to the environmental and related legislation.

107. Public consultations and focus group discussions (FGDs) were conducted by PPTA team on 19th February, 7th and 8th March 2014. The objective of the meetings was to appraise the stakeholders about environmental and social impacts of the proposed subproject and safeguards to mitigate the same. Key respondents included project-affected persons, who may suffer temporary access disruptions during construction activities, shopkeepers/businessmen from the subproject area, and daily commuters consulted randomly. Issues discussed and feedback received along with details of date, time, location, and list of participants are given in Appendix-5. The environmental concerns and suggestions made by the participants were listed, and discussed, and suggestions accordingly incorporated in the EMP. These include speedy construction works to ensure low impacts to community. Participants also considered the project will provide local employment.

108. Consultation with the *Nagorik* committee and selected households indicate that they will cooperate in the initiative for it will improve their environment in the community. They (households) will take part in the waste segregation at household into organic and inorganic wastes when the subproject will provide them two types of plastic bins: one for organic wastes and the other for inorganic wastes. They are also encouraged of the approach of waste segregation and appreciate that the recycling of both organic and inorganic waste will generate income for the poor waste/rag pickers. They will pay for the service as they are paying now. At present they are paying BDT50 per month per household for the service.

B. Future Consultation and Disclosure

109. This IEE and other relevant documents will be made available at public locations in the *pourashava* and posted on the websites of executing agencies and ADB. The consultation process will be continued and expanded during the project implementation to ensure stakeholders participate fully in project execution, as well as to implement comprehensive information, education, and communication plan.

110. The public consultation and disclosure program with all interested and affected partied will remain a continuous process throughout the project implementation, and shall include the following:

(i) **Consultations during construction phase:** (a) public meetings with affected communities to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and (b) smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and to provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

(ii) **Project disclosure:** (a) public information campaigns (via newspaper, flyers, and media) to explain the project to the wider city population and prepare them for disruptions they may experience once construction is underway; (b) public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in local language; (c) formal disclosure of completed project reports by making copies available at convenient locations in the study areas, and informing the public of their availability; and (d) providing a mechanism through which comments can be made.

111. For the benefit of the community, relevant information from the IEE will be translated in the local language and made available at (i) offices of executing and implementing agencies, (ii) area offices, (iii) consultant teams' offices; and (iv) contractor's campsites. It will be ensured that the hard copies of IEE are kept at places which are conveniently accessible to people, as a means to disclose the document and at the same time creating wider public awareness. An electronic version of the IEE will be placed in the official website of executing and implementing agencies and the ADB website after approval of the IEE by ADB.

VII. GRIEVANCE REDRESS MECHANISM

112. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of AP's concerns, complaints, and grievances about the social and environmental performance at the level of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

113. **Common GRM.** A common GRM will be in place for social, environmental, or any other grievances related to the project; the resettlement plans (RPs) and IEEs will follow the GRM described below, which is developed in consultation with key stakeholders. The GRM will provide an accessible and trusted platform for receiving and facilitating resolution of affected persons' grievances related to the project. The multi-tier GRM for the project is outlined below, each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required.

114. *Pourashava*-wide public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the campaign. The project implementation unit (PIU) designated safeguard focal person and governance improvement and capacity development consultants (GICDC) will conduct *pourashava*-wide awareness campaigns to ensure that poor and vulnerable households are made aware of grievance redress procedures and entitlements, and will work with the PMO and management, design and supervision consultants (MDSC) to help ensure that their grievances are addressed.

23. Affected persons (APs) will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes that have already been installed by project pourashavas or through telephone hotlines at accessible locations, by e-mail, by post, or by writing in a complaints register in pourashava offices. Appendix 7 has the sample grievance registration form. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. The project management office (PMO) safeguard officer will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party through the PIU designated safeguard focal person.

24. **Grievance redress process**. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor and MDSC on-site personnel will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact phone numbers and names of the concerned PIU safeguard focal person and contractors, will be posted at all construction sites at visible locations.

a. **1st Level Grievance.** The phone number of the PIU office should be made available at the construction site signboards. The contractors and PIU safeguard focal person can immediately resolve on-site in consultation with each other, and will be required to do so within 7 days of receipt of a complaint/grievance.
b. **2nd Level Grievance.** All grievances that cannot be redressed within 7 days at field/ward level will be reviewed by the grievance redress cell (GRC) headed by Panel Mayor of the pourashava with support from PIU designated safeguard focal person and MDSC regional environment and resettlement specialists. GRC will attempt to resolve them within 15 days.[20] The PIU designated safeguard focal person will be responsible to see through the process of redressal of each grievance.
c. **3rd Level Grievance.**The PIU designated safeguard focal person will refer any unresolved or major issues to the PMO safeguard officer and MDSC national environmental and resettlement specialists. The PMO in consultation with these officers/specialists will resolve them within 30 days.

[20] Grievance redress committees (GRC) will have been formed at Pourashava-level. For example in Lalmonirhat pourashava, the GRC comprises Panel Mayor as Chairperson, and 1 councilor, the pourashava Executive Engineer, Secretary *pourashava* and *pourashava* administrative officer, as members. All *pourashava*-level GRCs shall have at least one-woman member/chairperson and AP representative or independent NGO as committee member. In addition, for project-related grievances, representatives of APs, community-based organizations (CBOs), and eminent citizens must be invited as observers in GRC meetings.

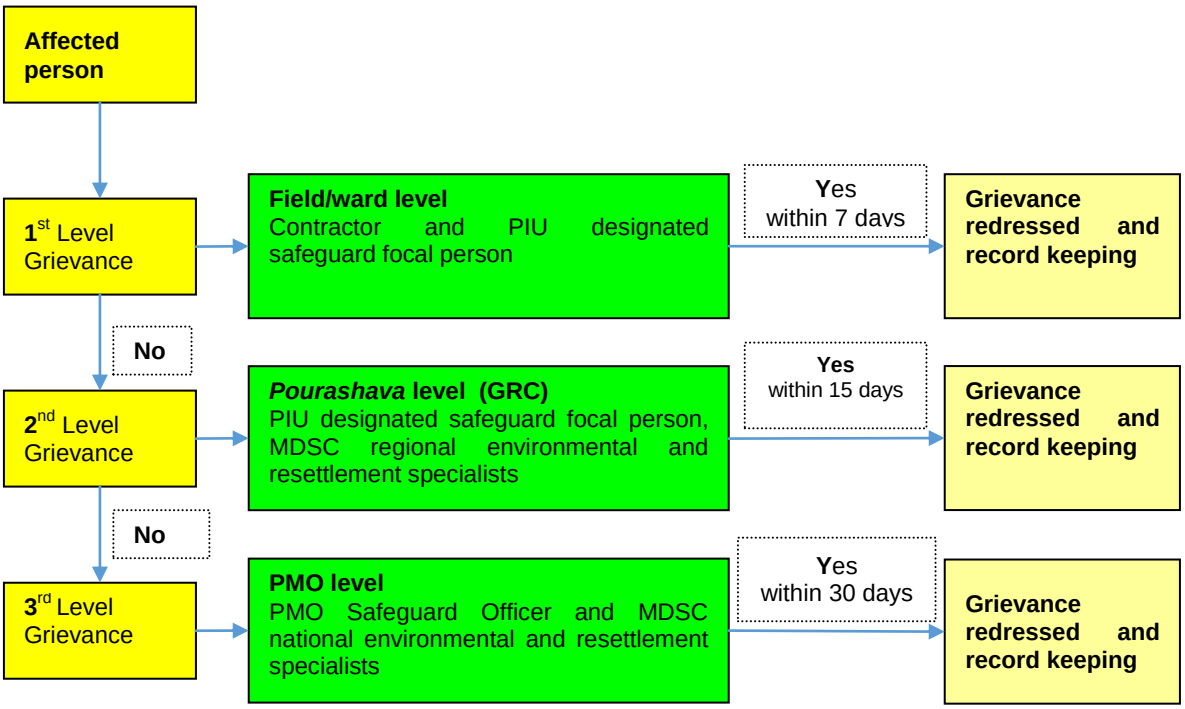
25. Despite the project GRM, an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

26. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism (AM) through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB Bangladesh Resident Mission (BRM). The complaint can be submitted in any of the official languages of ADB's DMCs. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the project GRM.

27. **Recordkeeping.** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome will be kept by PIU. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PMO office, *pourashava* office, and on the web, as well as reported in monitoring reports submitted to ADB on a semi-annual basis.

28. **Periodic review and documentation of lessons learned.** The PMO safeguard officer will periodically review the functioning of the GRM in each *pourashava* and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

29. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the concerned PIU at *pourashava*-level; while costs related to escalated grievances will be met by the PMO. Cost estimates for grievance redress are included in resettlement cost estimates.



Note: GRC = Grievance Redressal Cell; GICDC = Governance Improvement and capacity Development Consultants; PIU = Project Implementation Unit; MDSC = Management. Design and Supervision Consultants; PMO = Project Management Office

Figure 8: Project Grievance Redress Mechanism

VIII. ENVIRONMENTAL MANAGEMENT PLAN

115. The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of: (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and (iv) ensuring that safety recommendations are complied with.

116. A copy of the EMP must be kept on work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

117. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate a budget for compliance with these EMP measures, requirements and actions.

A. Institutional Arrangement

30. **Executing and implementing agencies.** The Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE), both under the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C) and having extensive experience in managing urban and water supply projects financed by ADB, will be the executing agencies of the project. The participating *pourashavas* will be the implementing agencies.

B. Safeguard Implementation Arrangement

31. **Project management office.** A PMO will be established for the overall management of the project. The PMO will be headed by Project Director (PD) supported by officials including three project managers in charge of (i) municipal infrastructure (excluding water supply and sanitation), (ii) water supply and sanitation, and (iii) governance improvement and capacity development, respectively. The PMO will receive support from national environmental specialist and national resettlement specialist on the MDSC team. Key tasks and responsibilities of the PMO safeguard (environment) officer are as follows:

(i) confirm existing IEEs/EMPs are updated based on detailed designs, and that new IEEs/EMPs are prepared in accordance with the EARF and subproject selection criteria related to safeguards;
(ii) confirm whether IEEs/EMPs are included in bidding documents and civil works contracts;
(iii) provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by project implementation unit (PIU) and contractors;
(iv) establish a system to monitor environmental safeguards of the project, including monitoring the indicators set out in the monitoring plan of the EMP;

(v) facilitate and confirm overall compliance with all government rules and regulations regarding site and environmental clearances, as well as any other environmental requirements (e.g., location clearance certificates, environmental clearance certificates, etc.), as relevant;
(vi) supervise and provide guidance to the PIUs to properly carry out the environmental monitoring and assessments as per the EARF;
(vii) review, monitor, and evaluate the effectiveness with which the EMPs are implemented, and recommend necessary corrective actions to be taken as necessary;
(viii) consolidate monthly environmental monitoring reports from PIUs and submit semi-annual monitoring reports to ADB;
(ix) ensure timely disclosure of final IEEs/EMPs in locations and form accessible to the public; and
(x) address any grievances brought about through the grievance redress mechanism in a timely manner.

118. **Project implementation unit**. The participating *pourashavas* will establish a PIU within the *pourashava* structure. The PIUs will (i) be responsible for land acquisition; (ii) take necessary action for obtaining rights of way; (iii) plan, implement and monitor public relations activities, gender mainstreaming initiatives and community participation activities at *pourashava* level; (iv) disseminate information related to the project to the public and media; (v) ensure compliance with loan covenants concerning safeguards measures; and (vi) facilitate implementation of safeguards plans. The PIUs will each designate a safeguard focal person[21] and will receive assistance from the assigned MDSC regional environmental specialist to:

(i) update IEEs/EMPs during detailed design stage and prepare new IEEs/EMPs in accordance with the EARF;
(ii) conduct environmental compliance audit of existing facilities as per Item F, Appendix 6 of ADB SPS, 2009;
(iii) include IEEs/EMPs in bidding documents and civil works contracts;
(iv) comply with all government rules and regulations;
(v) take necessary action for obtaining rights of way;
(vi) oversee implementation of EMPs including environmental monitoring by contractors;
(vii) take corrective actions when necessary to ensure no environmental impacts;
(viii) submit monthly environmental monitoring reports to PMO,
(ix) conduct continuous public consultation and awareness;
(x) address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs; and
(xi) organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.

119. **Project Management, Design and Supervision Consultants (MDSC).** MDSC will be engaged to work closely with and advise the PMO, to be involved in project supervision including monitoring during construction phase. The MDSC will have one national environmental

[21] It is recommended that existing *pourashava* health officer or executive engineer will also work as safeguard officer in addition to his/her regular responsibilities within the *pourashava*.

specialist and three regional environmental specialist as well as one national resettlement specialist and three regional resettlement specialist. The MDSC national environmental specialist will, but not limited to:

(i) work under the general supervision of the team leader and the deputy team leader;
(ii) review the environmental guidelines and requirement of the government of Bangladesh and ADB SPS, 2009, environmental subproject selection guidelines and EARF;
(iii) Guide the implementation of future subprojects;
(iv) provide technical support to the PMO and PIUs including review and update of EARF and guidelines for specific type of subprojects and assist in preparing terms of reference for environmental assessment;
(v) assist and guide the MDSC regional environmental specialists to provide support to environmental management functions including updating subproject IEEs in respect to EMP;
(vi) assist in preparing IEEs and in monitoring impact and mitigation measures associated with subprojects;
(vii) assist PIUs and MDSC regional environmental specialists working in the steps for preparing the EIA/IEE, capacity building and training, preparation of guidelines and procedure and subproject specific guidance;
(viii) provide support and guidance to PIUs in undertaking environmental monitoring
(ix) support PMU in submitting semi-annual environmental monitoring reports to ADB;
(x) facilitate in grievance redress and corrective actions;
(xi) train PIU officials regarding environmental requirement and issues; and
(xii) perform any other task assigned by the team leader, deputy team leader and the project director.

120. The MDSC regional environmental specialists will, but not limited to:

(i) work under the supervision and guidance of the team leader, deputy team leader and MDSC national environmental specialist;
(ii) assist PIUs in preparing and updating IEEs including EMPs in accordance with the EARF, and assist in monitoring impact and mitigation measures associated with subprojects including implementation of EMPs by contractors;
(iii) assist in preparation of IEEs and in the environmental review of subproject consisting of screening at *pourashava* level by PIU through a committee formed with municipal mayor as chairman and representatives from DOE, LGED and other relevant district office as members;
(iv) assist PIUs in the steps for preparing EIA/IEE, capacity building and training, preparation of guidelines and procedure and subproject specific guidance;
(v) support PIU in environmental monitoring and submit monitoring reports to PMU as inputs into the semi-annual monitoring report submitted to ADB;
(vi) undertake mitigation measures and other specific measures in the construction contract;
(vii) facilitate in grievance redress and corrective actions;
(viii) follow subproject selection guidelines and EARF to ensure compliance with the environmental guidelines and requirement of the Government of Bangladesh and ADB SPS, 2009;
(ix) support PMO and MDSC national environment specialist by providing data, information and all other requested assistance;

(x) train PIU officials regarding environmental issues
(xi) perform any other task assigned by MDSC national environment specialist, team leader, deputy team leader and the project director.

121. **Civil works contracts and contractors**. EMPs are to be included in bidding and contract documents and verified by the PIUs and PMO. The contractor will be required to designate an environmental supervisor to (i) coordinate with MDSC on updating the IEE/EMP based on detailed designs, and (ii) ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract.

122. **Governance Improvement and Capacity Development Consultants (GICDC)**. The PMO and PIUs will require support on a range of activities related to governance improvement and capacity development of *pourashavas*. The GICDC will support PMO and PIUs in implementing urban government improvement action plan (UGIAP) by providing capacity development, community mobilization and other facilitation services. There will be 4 GICDC regional offices consisting of 4 regional coordinators at each regional office. There will be 2 community mobilizers in each project pourashava. The regional coordinators will assist *pourashavas* and the community mobilizers in the activities related to community participation and inclusive development. The community mobilizers will be posted at the *pourashava* and will (i) have to work maintaining close liaison with the mayor, councilors, *pourashava* staffs and communities, (ii) provide assistance and support to PIU regarding planning and implementation of citizen awareness and participation activities, urban planning, equity and inclusiveness of women and urban poor. The GICDC will also have a training specialist who will be responsible for identifying and coordinating capacity building activities at *pourashava* level.

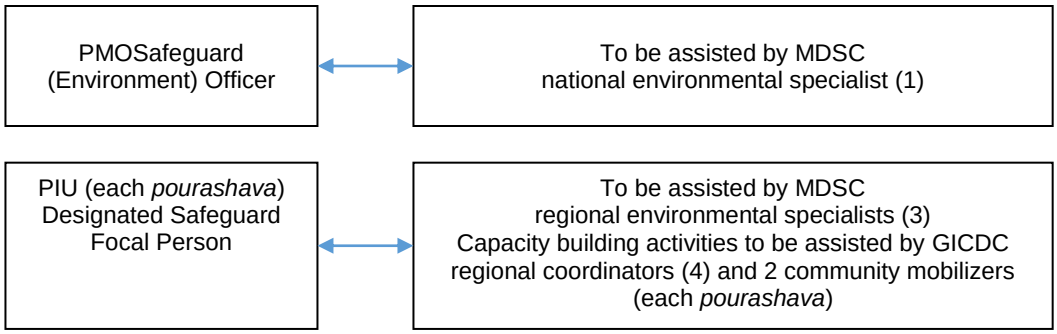


Figure 4: Safeguards Implementation Arrangement

Table 13: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
1. Prior to Construction Activities						
Consents, permits, clearances, no objection certificate (NOC), etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	• Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. • Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. • Include in detailed design drawings and documents all conditions and provisions if necessary	Project management office (PMO), project implementing unit (PIU), Management Design SupervisionConsultants (MDSC)	• Incorporated in final design and communicated to contractors.	• Prior to award of contract	• No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PMO and PIU. • Mitigation measures are included as part of TOR of PMO, PIU and MDSC.
Updating of IEE based on detailed design	Site-specific impacts not identified, mitigation measures not appropriate and sufficient to address impacts	• Update IEE and EMP based on detailed design • Ensure updated EMP is provided to contractors • Relevant information disclosed	PMO	• Updated IEE and EMP reviewed, approved and disclosed	• Upon completion of detailed design	• No additional cost required
Existing utilities	Disruption of services.	• Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction activities • Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • Require	PMO, PIU, and MDSC	• List of affected utilities and operators; • Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), spoil management plan (Appendix 3), and traffic management plan (Appendix4)	During detailed design phase • Review of spoils management plan: Twice (once after first draft and once before final approval)	• No cost required. • Mitigation measures are included as part of TOR of PMO, PIU, and MDSC.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		contractors to prepare spoils management plan (Appendix 4) and traffic management plan (Appendix 5)				
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	• Determine locations prior to award of construction contracts.	PMO, PIU, and MDSC	• List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. • Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	• During detailed design phase	• No cost required. • Mitigation measures are included as part of TOR of PMO, PIU, and MDSC.
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural Solid Waste Management patterns, ponding and water logging, and water pollution.	• Prepare list of approved quarry sites and sources of materials	PMO, PIU, and MDSC	• List of approved quarry sites and sources of materials; • Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	• During detailed design phase, as necessary with discussion with detailed design engineers and PIUs	• No cost required. • Mitigation measures are included as part of TOR of PMO, PIU, and MDSC.
EMP Implementation Training	Irreversible impact to the environment, workers, and community	• Project manager and all key workers will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for	Construction Contractor	• Proof of completion (Safeguards Compliance Orientation) • Posting of proof of completion at	• During detailed design phase prior to mobilization of workers to site	• Cost of EMP Implementation Orientation Training to contractor is responsibility of PMO and PIU.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		construction works; health and safety (H&S), core labor laws, applicable environmental laws, etc.		worksites • Posting of EMP at worksites		• Other costs responsibility of contractor.
2. During Construction Activities						
A. Physical Characteristics						
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may cause localized changes in topography and landforms. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Utilize readily available sources of materials. If contractor procures materials from existing burrow pits and quarries, ensure these conform to all relevant regulatory requirements. • Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.	Construction Contractor	• Records of sources of materials	• Monthly by PIU	• Cost for implementation of mitigation measures responsibility of contractor.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation	• Prepare and implement a spoils management plan (Appendix 4). • Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Magura local authority on designated disposal areas. • All earthworks must to be conducted	Construction Contractor	• Areas for stockpiles, storage of fuels and lubricants and waste materials; • Number of silt traps installed along trenches leading to water bodies; • Records of surface water quality inspection; • Effectiveness of water management	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. • Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any Solid Waste Management leading to water bodies. • Take all precautions to minimize the wastage of water in the construction activities. • Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the Solid Waste Management leading to the water bodies. • Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. • While working across or close to any water body, the flow of		measures; • No visible degradation to nearby Solid Waste Managements, *khals* or water bodies due to construction activities		

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		water must not be obstructed. Ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of any watercourse and cross Solid Waste Management channels. • Monitor water quality according to the environmental management plan.				
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. The impacts are negative but short-term, site-specific within a relatively small area and	• Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; • Use tarpaulins to cover soils, sand and other loose material when transported by trucks. • Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. • Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). • Monitor air quality.	Construction Contractor	• Location of stockpiles; • Number of complaints from sensitive receptors; • Heavy equipment and machinery with air pollution control devices; • Certification that vehicles are compliant with air quality standards.	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	reversible by mitigation measures.					
Acoustic environment	Construction activities will be on settlements, along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. • Plan activities in consultation with Magura local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. • Use of high noise generating equipment shall be stopped during night time. • Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; • Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. • All vehicles and equipment used in construction shall be fitted with exhaust silencers.	Construction Contractor	• Number of complaints from sensitive receptors; • Use of silencers in noise-producing equipment and sound barriers; • Equivalent day and night time noise levels	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		Use silent-type generators (if required). • Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. • If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. • Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.				
Aesthetics	The construction activities do not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty	• Prepare the Debris Disposal Plan • Remove all construction and demolition wastes on a daily basis. • Coordinate with Magura local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas Avoid stockpiling of any excess spoils • Suitably dispose	Construction Contractor	• Number of complaints from sensitive receptors; • Worksite clear of hazardous wastes such as oil/fuel • Worksite clear of any wastes, collected materials from Solid Waste Managements, unutilized materials and debris • Transport	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	containers, spoils, oils, lubricants, and other similar items. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	of collected materials from Solid Waste Managements, unutilized materials and debris either through filling up of pits/wasteland or at pre-designated disposal locations. • All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. • Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. • In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. • The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following		route and worksite cleared of any dust/mud		

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		preference hierarchy: reuse, recycling and disposal to designated areas;				
B. Biological Characteristics						
Biodiversity	Activities being located in the built-up area of Magura *pourashava*. There are no protected areas in or around subproject sites, and no known areas of ecological interest. There are no trees at the site that need to be removed.	• Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. • All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. • Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. • Prohibit employees from poaching wildlife and cutting of trees for firewood.	Construction Contractor	• PMO and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be determined during detailed design stage) • Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc.	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.
C. Socioeconomic Characteristics						
Existing provisions for	Road closure is not anticipated.	• Prepare and implement a Traffic	Construction Contractor	• Traffic route during construction	• Visual inspection by PIU	• Cost for implementation of

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
pedestrians and other forms of transport	Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject will follow existing ROW alignment. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	Management Plan (Appendix 5) • Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. • Maintain safe passage for vehicles and pedestrians throughout the construction period. • Schedule truck deliveries of construction materials during periods of low traffic volume. • Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. • Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. • Leave spaces for access between mounds of soil. • Provide walkways and metal sheets where required to maintain access across for people and vehicles. • Increase workforce in front of critical areas such as		works including number of permanent signage, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 4); • Number of complaints from sensitive receptors; • Number of signage placed at project location • Number of walkways, signage, and metal sheets placed at project location	and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		institutions, place of worship, business establishment, hospitals, and schools. • Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Socio-economic status	Subproject components will be located in government land and existing ROWs thus there is no requirement for land acquisition or any resettlements. Manpower will be required during the 18-months construction stage. This can result to generation of contractual	• Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. • Secure construction materials from local market.	Construction Contractor	• Employment records; • Records of sources of materials • Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	employment and increase in local revenue. Thus potential impact is positive and long-term.					
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Magura pourashava where there are a variety of human activities, will result to impacts to the sensitive receptors such as residents, businesses, and the community in general. Excavation may also damage existing infrastructure (such as water distribution pipes, electricity pylons, etc.) located alongside the roads. The	• Provide safety signage at all sites visible to public • Provide safety barriers near any trenches, and cover trenches with planks during non-work hours. • Obtain details from *pourashava* nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; • Integrate construction of the various infrastructure subprojects to be conducted in Magura (roads, water supply, etc.) so that different infrastructure is located on opposite sides of the road where feasible and roads and inhabitants are not subjected to repeated disturbance by construction in the same area at different times for different purposes. • Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local	Construction Contractor	• Utilities Contingency Plan • Number of complaints from sensitive receptors	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	concerns so that these can be addressed. • Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. • Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. • If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a	• Provide safety signage at all sites visible to public • Provide safety barriers near any trenches, and cover trenches with planks during non-work hours. • Contractor's activities and movement of staff will be restricted to	Construction Contractor	• Number of permanent signage, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 4); • Number of complaints from sensitive receptors; • Number of	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	relatively small area and reversible by mitigation measures.	designated construction areas. • Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. • Consult with Lalmonirhat local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. • If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. • Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.22 • Under no		walkways, signage, and metal sheets placed at project location • Agreement between landowner and contractors in case of using private lands as work camps, storage areas, etc.	final location of) subproject components	

[22] These products come in powder forms, and once mixed with water (being the catalyst) simply expand, and crack the rock from hole to hole. This product is environmentally friendly and can be washed away after it has been used.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		circumstances may open areas or the surrounding bushes be used as a toilet facility. • Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. • A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		to do. • Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. • The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.				
Workers health and safety	There is invariably a safety risk when construction works such as excavation and	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on	Construction Contractor	• Site-specific H&S Plan • Equipped first-aid stations • Medical insurance coverage	• Visual inspection by PIU and supervision consultants on monthly basis	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	workers H&S. • Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. • Produce and implement a site health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training[23] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.		for workers • Number of accidents • Records of supply of uncontaminated water • Condition of eating areas of workers • Record of H&S orientation trainings • Use of personal protective equipment • % of moving equipment outfitted with audible back-up alarms • Permanent sign boards for hazardous areas • Signage for storage and disposal areas • Condition of sanitation facilities for workers	• Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	

[23] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		• Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. • Provide medical insurance coverage for workers; • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		• Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Ensure moving equipment is outfitted with audible back-up alarms; • Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and • - Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.				
D. Historical, Cultural, and Archaeological Characteristics						
Physical and cultural heritage	Construction works will be on built-up areas of Magura thus risk for chance finds is low.	• All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of	Construction Contractor	• Records of chance finds	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		the government. • Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. • Stop work immediately to allow further investigation if any finds are suspected.			and sampling sites to be finalized during detailed design stage and final location of) subproject components	
E. Others						
Submission of EMP implementation report	Unsatisfactory compliance to EMP	• Appointment of supervisor to ensure EMP implementation • Timely submission of monitoring reports including pictures	Construction contractor	• Availability and competency of appointed supervisor • Monthly report	• Monthly monitoring report to be submitted by PIU to PMO • PMO to submit semi-annual monitoring report to ADB	• Cost for implementation of mitigation measures responsibility of contractor.
3. Post-construction Activities						
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	• Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and • All excavated roads shall be reinstated to original condition. • All disrupted utilities restored • All affected structures rehabilitated/compensated • The area that previously housed the construction camp is to be checked for spills of	Construction Contractor	• PMO/MDSC report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.	• Prior to turn-over of completed works to *pourashava*	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		substances such as oil, paint, etc. and these shall be cleaned up. • All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document. • The contractor must arrange the cancellation of all temporary services. • Request PMO/CSS to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.				

Table 14: Environmental Management and Monitoring Plan – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
Water quality	Run-off from stockpiled wastes and end-products of composting which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-	• Take all precautions to prevent entering of run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the channels leading to the water bodies.	• Magura *pourashava*	• No visible degradation to nearby *khals* and water bodies • Leachate/discharge quality and ECC conditions. Parameters to be monitored include suspended solids, dissolved solids (inorganic), pH, ammoniac nitrogen (as N), total nitrogen (as N),	• Everyday visual inspection for *khals*, drains, and water bodies within 30 m circumference of the facilities • Monthly monitoring of leachate and/or as prescribe by ECR,	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	specific within a relatively small area and reversible by mitigation measures.	• Remove all wastes, by-, and end-products immediately. • Monitor discharge of leachate including review of ECC conditions. • Monitor compost quality. • Monitor treated wastes quality.		biochemical and chemical oxygen demand, arsenic mercury, lead, cadmium, total chromium, copper, zinc, nickel, cyanide, chloride, fluoride, phenol compounds and others as per ECR, 1997. • Compost quality to meet standards for arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, pH and other parameters as prescribed by the government. • Autoclave operations as per manufacturers specification, Medical Wastes Rules and conditions of the ECC • Treated medical wastes to meet standards for spore tests, and other routine tests (visual).	1997 • Prior to packaging of compost visual inspection to ensure that glass, plastic and other physical inerts and fragments are absent in compost and it has no offensive smell. • Monthly monitoring of compost and/or as prescribed by the government. • Daily monitoring of autoclave operations • Monthly monitoring of spore and routine tests and/or as prescribed by the government.	
Air quality	Moving wastes, by- and end-products (such as composts) may create dusts during dry season. Landfill gas generation. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Use bin covers and/or tarpaulins during transport of wastes, by-, and end products (compost) • Use tarpaulin to cover soils, sand and other loose material that will be used in the controlled landfill. • Green belt will be developed around the facilities to act as a barrier for dust pollution.	• Magura *pourashava*	• No complaints from sensitive receptors	• During collection of wastes • During transport of wastes, by-, and end-products to the facilities • During transport of cover materials	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		• Only inert waste will be sent to controlled landfill so that landfill gas formation is minimum.				
Acoustic environment	Increase in noise level due to presence of workers and movement of vehicles. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Plan activities in consultation with Magura *pourashava* so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance.	• Magura *pourashava*	• No complaints from sensitive receptors	• During O&M phase	• Included in O&M cost
B. Biological Characteristics						
Biodiversity	Activities in the built-up area of Magura *pourashava*. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	• No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal). • Monitor survival rate of vegetation (plants and trees) in the green belt of the facilities.	• Magura *pourashava*	• No complaints from sensitive receptors • Survival rate of vegetation/green belt	• During O&M phase • Vegetation monitoring to be implemented until trees are 2 m high	• Included in O&M cost
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Increase in traffic in the *pourashava* during collection, loading and unloading of wastes. The impacts are	• Early hour collection will be enforced before the peak traffic hours. • Maintain safe passage for vehicles	• Magura *pourashava*	• No complaints from sensitive receptors	• During O&M phase	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	and pedestrians. • Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. • Notify affected sensitive receptors by providing sign boards and contact numbers for concerns/complaints. • Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. • Consult businesses and institutions regarding operating hours and factoring this in work schedules. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Workers health and safety	Workers need to be mindful of the occupational hazards working in waste management facilities. Potential impacts are negative and long-term but	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S.	• Magura *pourashava*	• No complaints from sensitive receptors • No complaints from workers related to O&M activities • Zero accident	• Duration of repair works	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	reversible by mitigation measures.	• Ensure that all site personnel have a basic level of H&S training. • Produce and implement a O&M health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training[24] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and				

[24] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		appliances • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. • Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.				
Community health and safety	Possibleaccumulation of waste causing health problems for	• Wet/biodegradable wastes will be emptied directly from	• Magura *pourashava*	• No complaints from sensitive receptors	• During O&M phase	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	community. Pests and vermin. Potential impacts are negative and long-term but reversible by mitigation measures.	the bins to primary collection vehicles daily and dry/non-biodegradable wastes once in a week. The number and type of bins and vehicles to be procured under the project is sufficient to ensure no accumulation of wastes in the community. • Wastes will be collected regularly to prevent pests and vermin.				

C. Institutional Capacity Development Program

123. The MDSC national and regional environmental specialists will be responsible for trainings on environmental awareness and management in accordance with both ADB and government requirements. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project along with the frequency of sessions is presented in Table 12.

Table 12: Training Program for Environmental Management

Items	**Pre-construction/prior to construction**	**Construction**	
Training Title	Orientation workshop	Orientation program/ workshop for contractors and supervisory staffs	Experiences and best practices sharing
Purpose	To aware the participants of the environmental safeguard requirements of ADB and GOB and how the project will meet these requirements	To build the capacity of the staffs for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and GOB	To share the experiences and best practices aimed at learning lessons and improving implementation of EMP
Contents	**Module 1: Orientation** • ADB Safeguards Policy Statement • Government of Bangladesh Environmental Laws and Regulations **Module 2: Environmental Assessment Process** • ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements • Review of environmental assessment report to comply with ADB requirements • Incorporation of EMP into the project design and contracts	• Roles and responsibilities of officials/contractors/consultants towards protection of environment • Environmental issues during construction • Implementation of EMP • Monitoring of EMP implementation • Reporting requirements	Experiences on EMP implementation – issues and challenges Best practices followed
Duration	1 day	1 day	1 day on a regular period to be determined by PMO, PIUs, and PMSC
Participants	LGED, DPHE, PMO, and PMO staffs (technical and environmental) involved in the project implementation	PMO PIUs Contractors	PMO PIUs Contractors

D. Staffing Requirement and Budget

124. Costs required for implementing the EMP will cover the following activities:

(i) Updating IEE, preparing and submitting reports and public consultation and disclosure;
(ii) Application for environmental clearances; and
(iii) Implementation of EMP, environmental monitoring program and long-term surveys.

125. The infrastructure involved in each scheme is generally straightforward and will take between three and nine months to build. Environmental monitoring during construction will also be straightforward and will involve periodic site observations and interviews with workers and others, plus checks of reports and other documents. This will be conducted by MDSC environmental management specialist assisted by the PMO environment officer. The environmental management specialist will update the IEE as necessary and perform tasks as specified in the TOR. Therefore no separate budget required for MDSC environment management specialist.

126. The cost of mitigation measures and surveys during construction stage will be incorporated into the contractor's costs, which will be binding on him for implementation. The surveys will be conducted by the contractors.

127. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of Magura *pourashava*. All monitoring during the operation and maintenance phase will be conducted by LGED and Magura pourashava, therefore, there are no additional costs.

128. The indicative costs of EMP implementation are shown in Tables 13 and 14 (by source of funds).

Table 13: Indicative Cost of EMP Implementation

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
A.	**Mitigation Measures**						
1.	Compensatory plantation measures	Construction	Per tree	50	1,500	75,000	Civil works contract
B.	**Monitoring Measures**						
1.	Air quality monitoring	- Pre-construction - Construction	Per location	20	30,000	60,000	Civil works contract
2.	Noise levels monitoring	- Pre-construction - Construction	Per location	20	10,000	200,000	Civil works contract
3.	Leachate monitoring	- O&M	lump sum per year (to be updated during detailed design stage as per ECC and O&M		100,000	100,000	*Pourashava*

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
			manual)				
4.	Compost quality monitoring	- O&M	lump sum per year (to be updated during detailed design stage as per ECC and O&M manual)		10,000	10,000	*Pourashava*
5.	Spore and routine test	- O&M	lump sum per year (to be updated during detailed design stage as per ECC and O&M manual)		10,000	10,000	*Pourashava*
C	**Capacity Building**						
1.	(i) Orientation workshop for officials involved in the project implementation on ADB Safeguards Policy Statement, Government of Bangladesh environmental laws and regulations, and environmental assessment process; (ii) induction course contractors, preparing them on EMP implementation and environmental monitoring requirements related to mitigation measures; and taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation; and (iii) lessons learned information sharing	Module 1 – immediately upon engagement of the MDSC environmental specialists Module 2 – prior to award of civil works contracts (twice a year for 4 years) Module 3 – prior to start of Phase 2 and upon completion of the project	lump sum		Module 1 – 30,000 Module 2 – 30,000 Module 3 – 30,000	90,000	Covered under MDSC contract
D.	**Consultants Costs**						
1.	MDSC national environmental specialist (1 person)	Responsible for environmental safeguards of the project	person months (spread over entire	60 person months	320,000 per person month	1,280,000	Remuneration and budget for travel covered in the MDSC

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
			project implementation period)				contract
2.	MDSC regional environmental specialists (3 persons)	Responsible for environmental safeguards of the project	person months (spread over entire project implementation period)	60 each = 180 person-months	320,000 per person-month	57,600,000	Remuneration and budget for travel covered in the MDSC contract
E.	**Administrative Costs**						
1.	Legislation, permits, and agreements	Permit for excavation, tree-cutting permits, etc.	Lump sum		50,000	50,000	These consents are to be obtained by contractor at his own expense.
		Environmental assessment and environmental clearances as per ECA and ECR requirements Obtaining right of way clearances with related national agencies.	Lump sum		100,000	100,000	LGED DPD cost for municipal infrastructures
F.	**Other Costs**						
1.	Public consultations and information disclosure	Information disclosure and consultations during preconstruction and construction phase, including public awareness campaign through media	As per requirement	Lump sum		1,000,000	Covered under MDSC contract
2.	GRM implementation	Costs involved in resolving complaints (meetings, consultations, communication, and reporting/information dissemination)		Lump sum		1,000,000	PMO cost
3.	Any unanticipated impact due to project implementation	Mitigation of any unanticipated impact arising		Lump sum	Contractor's liability	As per insurance requireme	Civil works contract – contractor's

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
		during construction phase and defect liability period				nt	insurance

Table 13: Indicative Cost of EMP Implementation – Per Source of Funding

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
A. Contractors							
1.	Compensatory plantation measures	Construction	Per tree	50	1,500	75,000	Civil works contract
2.	Air quality monitoring	- Pre-construction - Construction	Per location	20	30,000	60,000	Civil works contract
3.	Noise levels monitoring	- Pre-construction - Construction	Per location	20	10,000	200,000	Civil works contract
4.	Legislation, permits, and agreements	Permit for excavation, tree-cutting permits, etc.	Lump sum		50,000	50,000	These consents are to be obtained by contractor at his own expense.
5.	Any unanticipated impact due to project implementation	Mitigation of any unanticipated impact arising during construction phase and defect liability period		Lump sum	Contractor's liability	As per insurance requirement	Civil works contract – contractor's insurance
	Subtotal					**720,000**	
B. MDSC							
1.	Public consultations and information disclosure	Information disclosure and consultations during preconstruction and construction phase, including public awareness campaign through media	As per requirement	Lump sum		1,000,000	Covered under MDSC contract
2.	(i) Orientation workshop for officials involved in the project implementation on ADB Safeguards Policy Statement, Government of Bangladesh environmental laws and regulations, and environmental assessment process;	Module 1 – immediately upon engagement of the MDSC environmental specialists Module 2 – prior to award of civil works contracts (twice a year for	lump sum		Module 1 – 30,000 Module 2 – 30,000 Module 3 – 30,000	90,000	Covered under MDSC contract

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
	(ii) induction course contractors, preparing them on EMP implementation and environmental monitoring requirements related to mitigation measures; and taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation; and (iii) lessons learned information sharing	4 years) Module 3 – prior to start of Phase 2 and upon completion of the project					
3.	MDSC national environmental specialist (1 person)	Responsible for environmental safeguards of the project	person months (spread over entire project implementation period)	60 person months	320,000 per person month	1,280,000	Remuneration and budget for travel covered in the MDSC contract
4.	MDSC regional environmental specialists (3 persons)	Responsible for environmental safeguards of the project	person months (spread over entire project implementation period)	60 each = 180 person-months	320,000 per person-month	57,600,000	Remuneration and budget for travel covered in the MDSC contract
	Subtotal					**59,970,000**	
C. Administrative Cost (Recurring) - PMO							
1.	Legislation, permits, and agreements	Environmental assessment and environmental clearances as per ECA and ECR requirements Obtaining right of way clearances with related national agencies.	Lump sum		100,000	100,000	LGED DPD cost for municipal infrastructures
2.	GRM implementation	Costs involved in resolving complaints (meetings, consultations, communication, and reporting/inform		Lump sum		1,000,000	PMO cost

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
		ation dissemination)					
	Subtotal					**1,100,000**	
D. Administrative Cost (Recurring) –PIU (Magura *Pourashava*)							
1.	Leachate monitoring	- O&M	lump sum per year (to be updated during detailed design stage as per ECC and O&M manual)		100,000	100,000	*Pourashava*
2.	Compost quality monitoring	- O&M	lump sum per year (to be updated during detailed design stage as per ECC and O&M manual)		100,000	100,000	*Pourashava*
	Subtotal (per year)					**200,000**	

IX. CONCLUSION AND RECOMMENDATIONS

129. The process described in this document has assessed the environmental impacts of all elements of Magura solid waste management subject. All potential impacts were identified in relation to design and location, construction, and operation phases.

130. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the project design or location were not significant.

131. Most of the individual elements of the subproject are relatively small and involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant. Most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving trenching and other excavation. However, the routine nature of the impacts means that most can be easily mitigated. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

132. The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB and LGED websites. The consultation process will be continued and expanded during project implementation to ensure

that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

133. The PMO and MDSC will be responsible for monitoring. The MDSC will submit monthly monitoring reports to PMO, and the PMO will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

134. The EMP will assist the PMO, MDSC, and contractors in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project. The EMP will also ensure efficient lines of communication between the implementing agency, project management unit, and contractors. A copy of the EMP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

135. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Magura will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

136. As per Government of Bangladesh ECA, 1995 and ECR, 1997, the subproject is categorized as “red”; and LCC and ECC must be obtained from DoE.

137. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject as Category “B” is confirmed. No further special study or detailed EIA needs to be undertaken to comply with ADB SPS, 2009.

Appendix 1: Rapid Environmental Assessment Checklist

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area adjacent to or within any of the following environmentally sensitive areas?			Magura *pourashava* covers an area of 47.30 sq.km with a population density of 2,079 persons/sq.km. The area is predominantly residential. The location of the proposed controlled disposal site is 2.5 km from the core urban area.
Cultural heritage site		✓	
Protected area		✓	
Wetland		✓	
Mangrove		✓	
Estuarine		✓	
Buffer zone of protected area		✓	
Special area for protecting biodiversity		✓	
B. Potential Environmental Impacts Will the Project cause…			
• impacts associated with transport of wastes to the disposal site or treatment facility	✓		Subproject will improve current collection and transport of wastes.
• impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	Not applicable
• degradation of aesthetic and property value loss?		✓	Subproject will improve the existing dumping site adjacent to the highway.
• nuisance to neighboring areas due to foul odor and influx of insects, rodents, etc.?	✓		Subproject will improve the current situation. During construction problem may increase. O&M Manual to be developed under the project will include odor and pest control.
• dislocation or involuntary resettlement of people?		✓	Not applicable
• disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?		✓	Not applicable. Rag pickers/scavengers are not present in the existing dumpsite.
• risks and vulnerabilities related occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate impacts.
• public health hazards from odor, smoke from fire, and diseases transmitted by flies, insects, birds and rats?	✓		O&M Manual to be developed under the project will include fire, odor and appropriate pest control.
• deterioration of water quality as a result of contamination of receiving waters by leacheate from land disposal system?	✓		Leachate management measures have been incorporated in the preliminary design
• contamination of ground and/or surface water by leachate from land disposal system?	✓		Preliminary design includes construction of impermeable layer at the base of the site and inner side slope of the embankment for groundwater protection (subject to detailed geological investigation during detailed design)
• land use conflicts?		✓	Not applicable. No change in land use.
• pollution of surface and ground water from leachate coming form sanitary landfill sites or methane gas produced from decomposition of solid wastes in the absence of air, which could enter the aquifer or escape through soil fissures at places far from the landfill site?		✓	Leachate and landfill gas management measures have been incorporated in the preliminary design.
• inadequate buffer zone around landfill site to alleviate nuisances?		✓	Buffer zone and greenbelt around facilities included in preliminary designs.
• road blocking and/or increased traffic during construction of facilities?		✓	Road closures are not required. Construction contractors will be required to implement traffic management plan and

Screening Questions	Yes	No	Remarks
			coordinate with Magura local authority.
• noise and dust from construction activities?	✓		Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants. The impacts are negative but short-term, site-specific within a relatively small area and reversible through mitigation measures.
• temporary silt runoff due to construction?	✓		Due to excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants. The impacts are negative but short-term, site-specific within a relatively small area and reversible through mitigation measures.
• hazards to public health due to inadequate management of landfill site caused by inadequate institutional and financial capabilities for the management of the landfill operation?	✓		Appropriate institutional development and capacity building for Magura *pourashava* included in the project
• emission of potentially toxic volatile organics from land disposal site?		✓	Not anticipated.
• surface and ground water pollution from leachate and methane gas migration?		✓	Leachate and landfill gas management measures have been incorporated in the preliminary design.
• loss of deep-rooted vegetation (e.g. tress) from landfill gas?		✓	Not anticipated. Deep-rooted vegetation no present in existing dumpsite
• explosion of toxic response from accumulated landfill gas in buildings?		✓	Not anticipated. Expected GHG generation is insignificant. Preliminary design includes gas vents.
• contamination of air quality from incineration?		✓	Not applicable.
• health and safety hazards to workers from toxic gases and hazardous materials in the site?		✓	Personal protective equipment will be provided to workers. Regular training will also be conducted to ensure that workers are aware of construction hazards and risks of chemicals during O&M.
• large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Improved solid waste management systems through capacity building and institutional development will ensure reduced burden on services and infrastructure.
• social conflicts if workers from other regions or countries are hired?		✓	Priority in employment will be given to local residents.
• risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	Not applicable. Construction will not involve use of explosives and chemicals.
• community safety risks due to both accidental and natural hazards, especially where the structural elements or components (e.g., landfill or incinerator) of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		✓	Operational area will be clearly demarcated and access will be controlled. Only worker and project concerned members will be allowed to visit the operational sites.

A Checklist for Preliminary Climate Risk Screening

Screening Questions	Score	Remarks[25]

[25] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate

Screening Questions		Score	Remarks[25]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	Key facilities will be located/constructed above the highest recorded flood level plus some freeboard.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): Medium

Other Comments: _____

Prepared by: PPTA Consultants
Designation: Environment Specialist
Date: Project Preparatory Stage (Dec 2013-April 2014)

parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Appendix 2: Environmental Standards and Application Fees

The standards for air, water, sound, odor and other components of the environment applicable to the project shall be determined in accordance with the standards specified in Schedules 2, 3, 4, 5, 6, and 8 of ECR, 1997.

	Standards	**ECR, 1997 (Rule 12) http://www.moef.gov.bd/html/laws/env_law/178-189.pdf**
1.	Air	Schedule 2
2.	Inland surface water	Schedule 3
	Drinking water	
3.	Sound	Schedule 4
4.	Sound Originating from Motor Vehicles or Mechanized Vessels	Schedule 5
5.	Emission from Motor Vehicles	Schedule 6
7.	Odor	Schedule 8

The standard limits of discharge of liquid waste and gaseous emissions applicable to the project shall be determined in accordance with the standards specified in Schedule 9 and 10

	Environmental Component	**ECR, 1997 (Rule 13) http://www.moef.gov.bd/html/laws/env_law/178-189.pdf**
1.	Sewage Discharge	Schedule 9
2.	Waste from Industrial Units or Projects Waste (see discharge to inland surface water and irrigated land)	Schedule 10

The fees for issuance of environmental clearance certificate and its renewal shall be payable in accordance with Schedule 13. The fees for analysis of samples of water, liquid waste, air and sound and also the information or data derived from such analysis are described in Schedule 14.

	Fees	**ECR, 1997 (Rule 14 and 15) http://www.moef.gov.bd/html/laws/env_law/178-189.pdf**
1.	Environmental clearance certificate or renewal	Schedule 13
2.	Supplying various analytical information or data or test results of samples of water, effluent, air and sound	Schedule 14

[1]"SCHEDULE – 13

Fees for Environmental Clearance Certificate or Renewal
[See Rules 7(5), 8(2) and 14]

1. Industrial unit or project

Investment (in Taka)	Fees for Environmental Clearance Certificate (in Taka)	Certificate Renewal Fee
(1)	(2)	(3)
(a) Between Tk. 100,000 and 5,00,000	Tk. 1,500	One-fourth of the fees in Column (2).
(b) Between Tk. 5,00,000 and 10,00,000	Tk. 3,000	-Do-
(c) Between Tk. 10,00,000 and 50,00,000	Tk. 5,000	-Do-
(d) Between Tk. 50,00,000 and 10,000,000	Tk. 10,000	-Do-

[1] *Schedule-13 was substituted by Notification S.R.O. No. 234-Law/2002 dated 24/08/2002 and came into force on 26/08/2002 being the date of publication in Bangladesh Gazette extraordinary issue.*

(1)	(2)	(3)
(e) Between Tk. 10,000,000 and 2,00,000,000	Tk. 25,000	One-fourth of the fees in Column (2).
(f) Between Tk. 2,00,000,000 and 5,00,000,000	Tk. 50,000	-Do-
(g) Above Tk. 5,00,000,000	Tk. 1,00,000	-Do-

Appendix 3: Sample Outline Spoils Management Plan

I. Spoils information

   A. Materials type
   B. Potential contamination
   C. Expected volume and sources
   D. Spoil classification

II. Spoils management

   A. Transportation of spoil
   B. Storage of spoil
   C. Contaminated spoil
   D. Approved reuse and/or disposal sites

III. Records of reuse and/or disposal

Appendix 4: Sample Outline Traffic Management Plan

A. Principles

1. One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:
   (i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
   (ii) protection of work crews from hazards associated with moving traffic;
   (iii) mitigation of the adverse impact on road capacity and delays to the road users;
   (iv) maintenance of access to adjoining properties; and
   (v) addressing issues that may delay the project.

B. Operating Policies for TMP

2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.
   (i) Make traffic safety and temporary traffic control an integral and high-priority element of every project from planning through design, construction, and maintenance.
   (ii) Inhibit traffic movement as little as possible.
   (iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
   (iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
   (v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
   (vi) Train all persons that select, place, and maintain temporary traffic control devices.
   (vii) Keep the public well informed.
   (viii) Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

3. **Figure A2 to Figure A12**illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the impact due to street closure

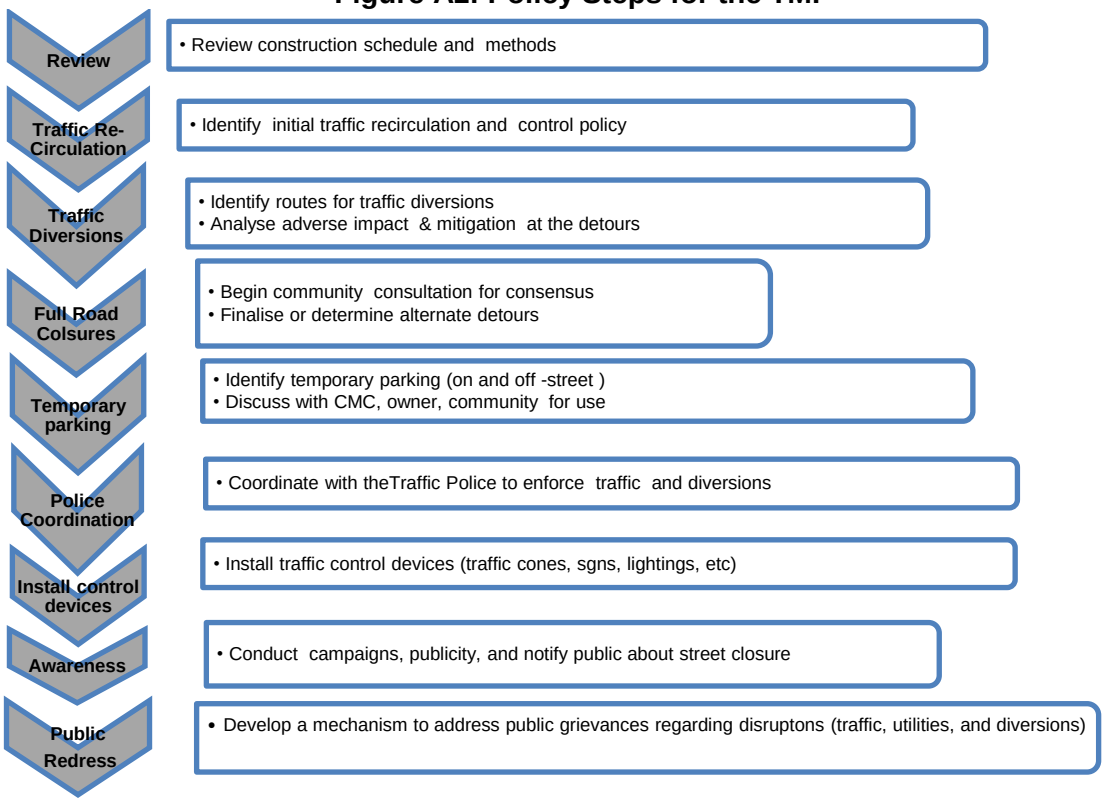
4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

   (i) approval from the ULB/CMC/Public Works Department (PWD) to use the local streets as detours;
   (ii) consultation with businesses, community members, traffic police, PWD, etc., regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
   (iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;

(iv) determining if additional traffic control or temporary improvements are needed along the detour route;
(v) considering how access will be provided to the worksite;
(vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
(vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

5. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the detour street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Figure A1: Policy Steps for the TMP



D. Public awareness and notifications

5a. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public

claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

7. The PIU will also conduct an awareness campaign to educate the public about the following issues:

(i) traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
(ii) defensive driving behaviour along the work zones; and
(iii) reduced speeds enforced at the work zones and traffic diversions.

8. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

9. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centers. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

(i) explain why the brochure was prepared, along with a brief description of the project;
(ii) advise the public to expect the unexpected;
(iii) educate the public about the various traffic control devices and safety measures adopted at the work zones;
(iv) educate the public about the safe road user behaviour to emulate at the work zones;
(v) tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
(vi) indicate the office hours of relevant offices.

E. Install traffic control devices at the work zones and traffic diversion routes

10. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

- Signs
- Pavement Markings
- Channelizing Devices
- Arrow Panels
- Warning Lights

11. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

12**.** **Figure A2 to Figure A12** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

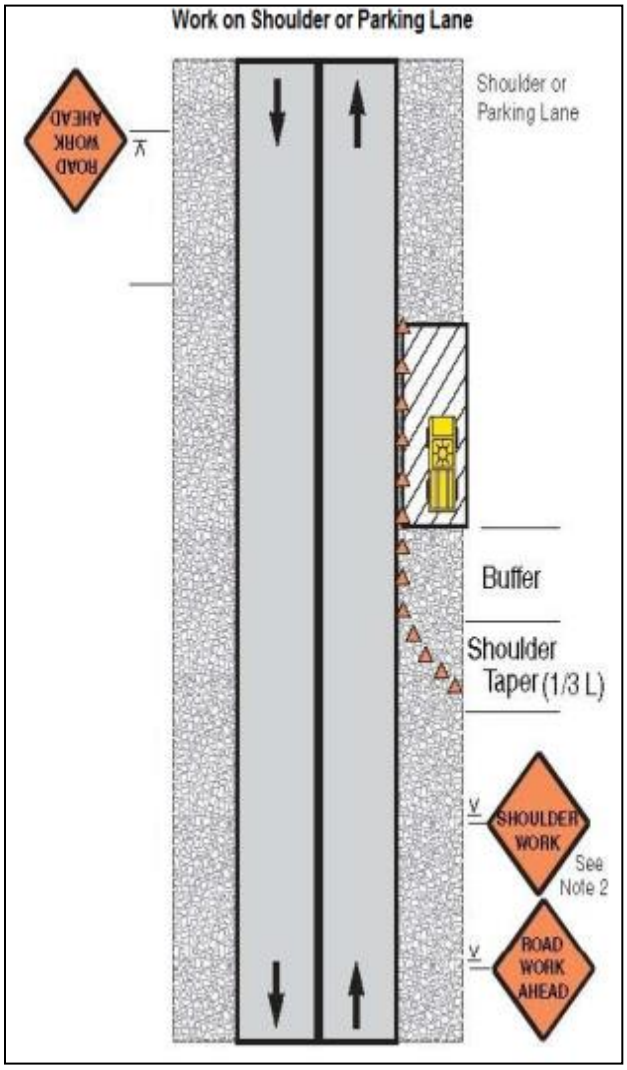
- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- Lane closure on a two-line road with low volume (with yield sign)
- Lane closure on a two-line road with low volume (one flagger operation)
- Lane closure on a two lane road (two flagger operation)
- Lane closure on a four lane undivided Road
- Lane closure on divided roadway
- Half road closure on multi-lane roadway
- Street closure with detour

13. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

14. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

16. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

Figure A2 & A3: Work on shoulder or parking lane and shoulder or parking lane closed on divided road



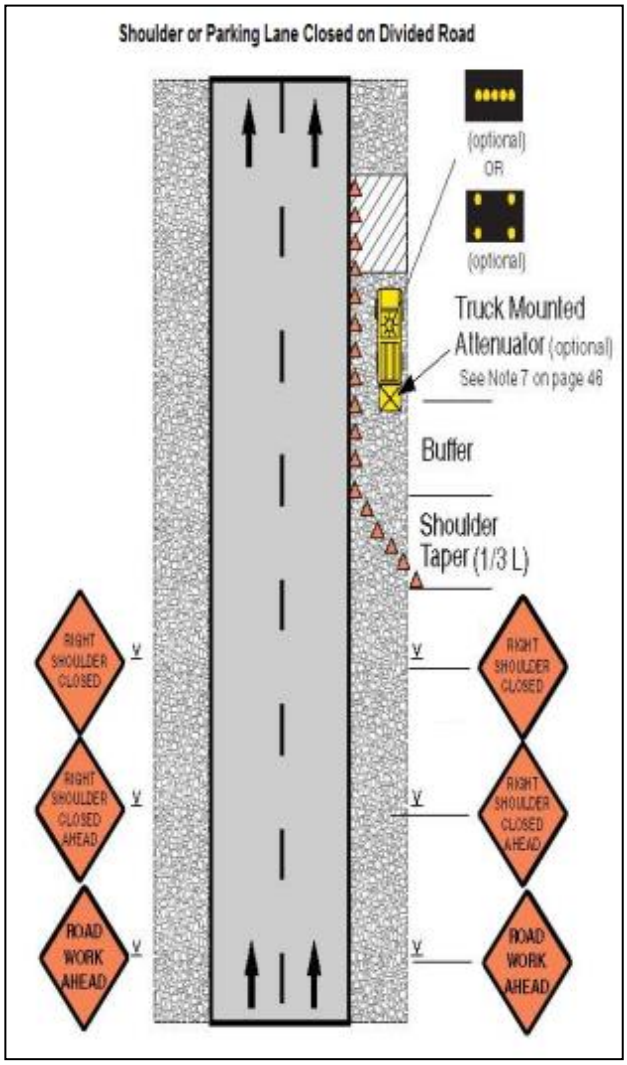


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

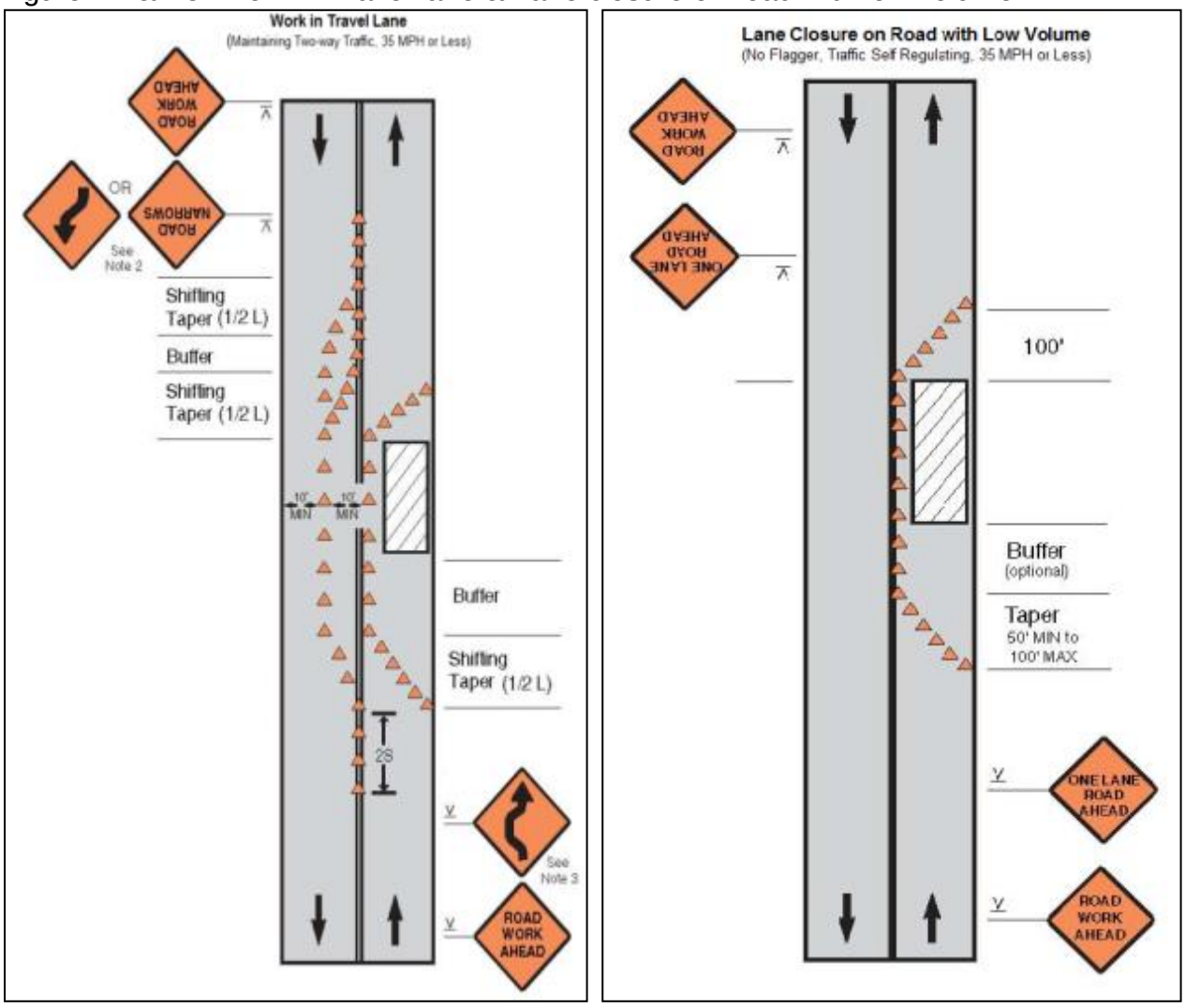
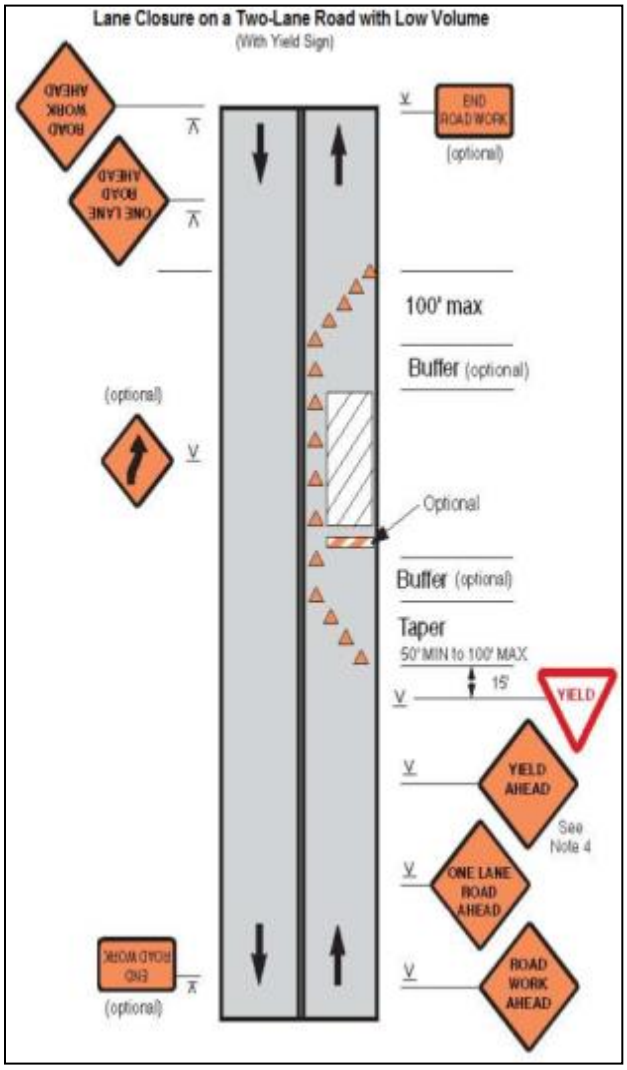


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)



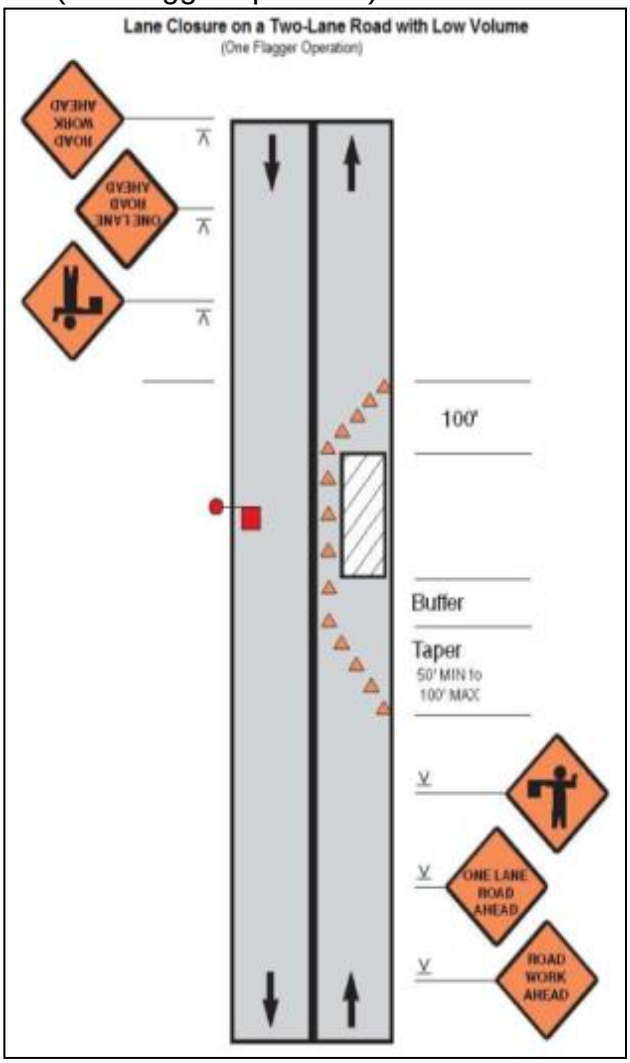
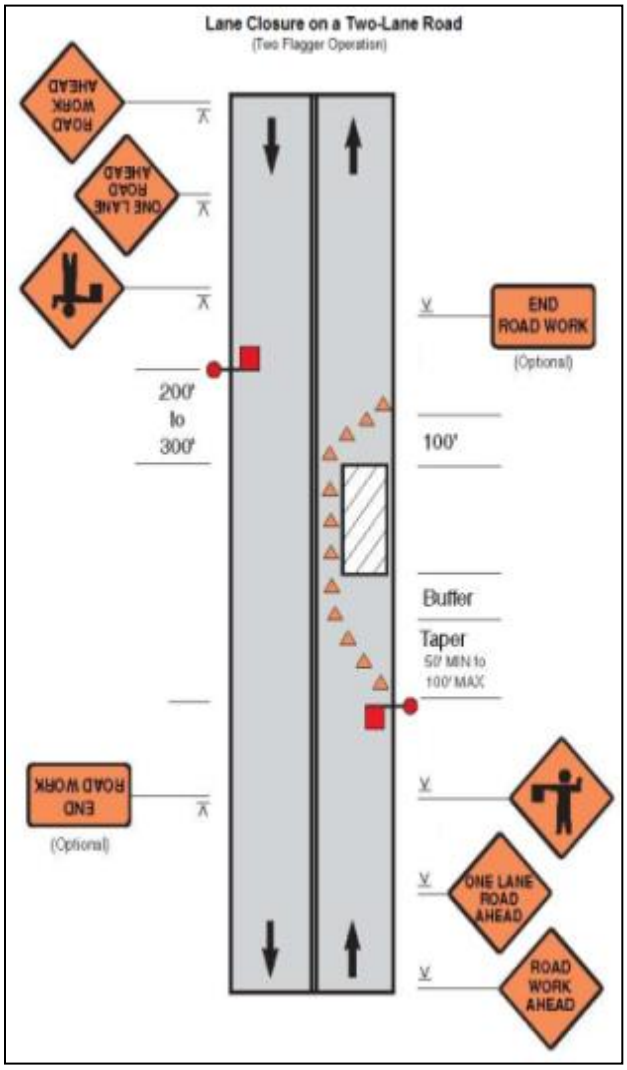


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road



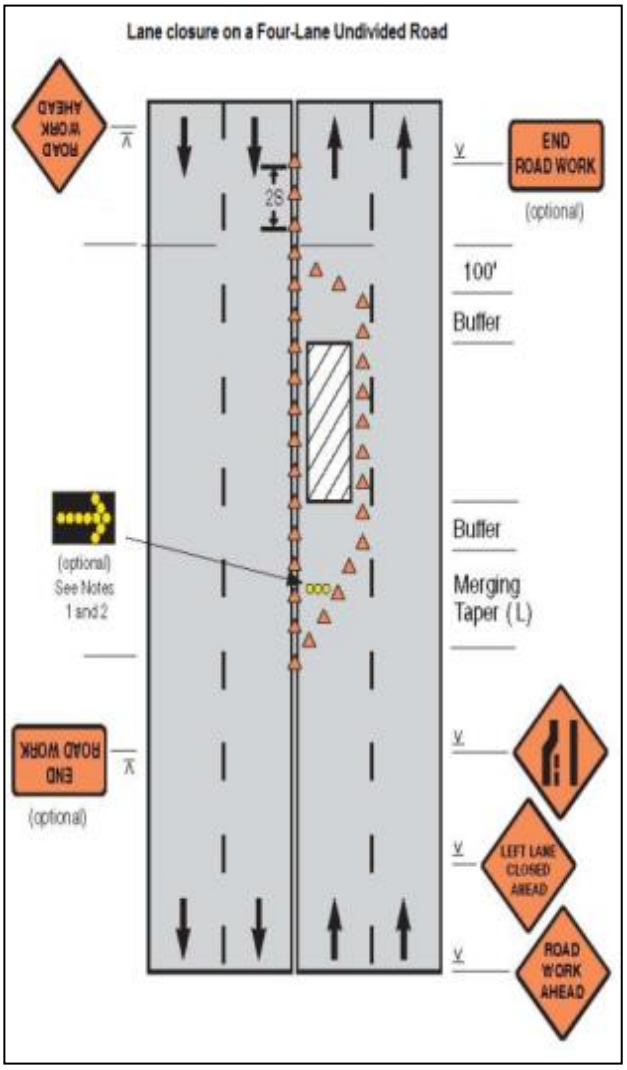
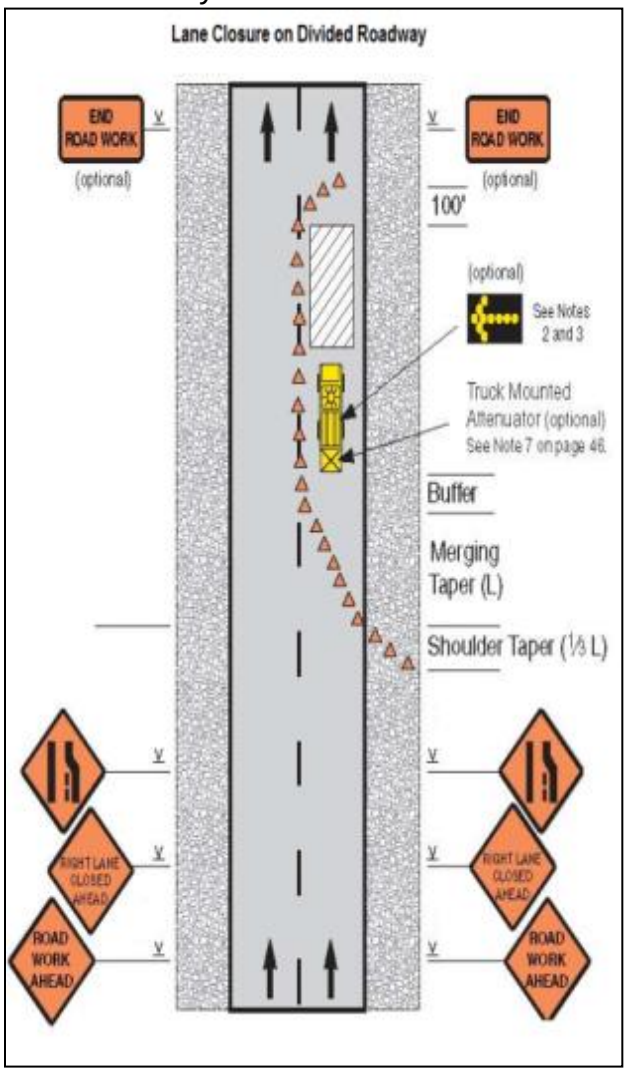


Figure A10 & A11: Lane Closure nn Divided Roadway & Half Road Closure On Multi-Lane Roadway



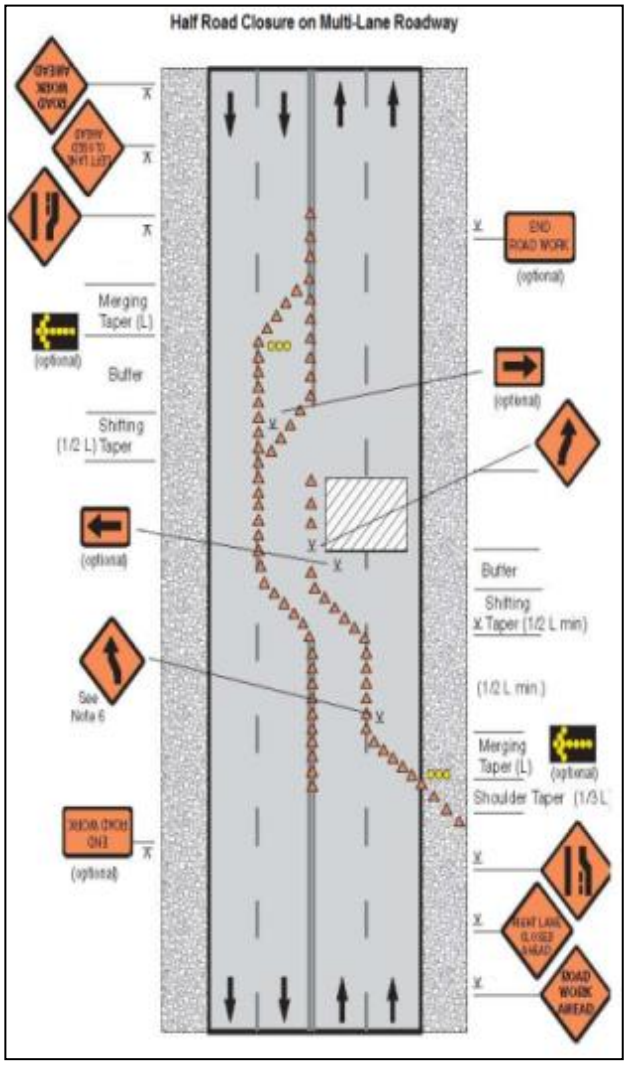
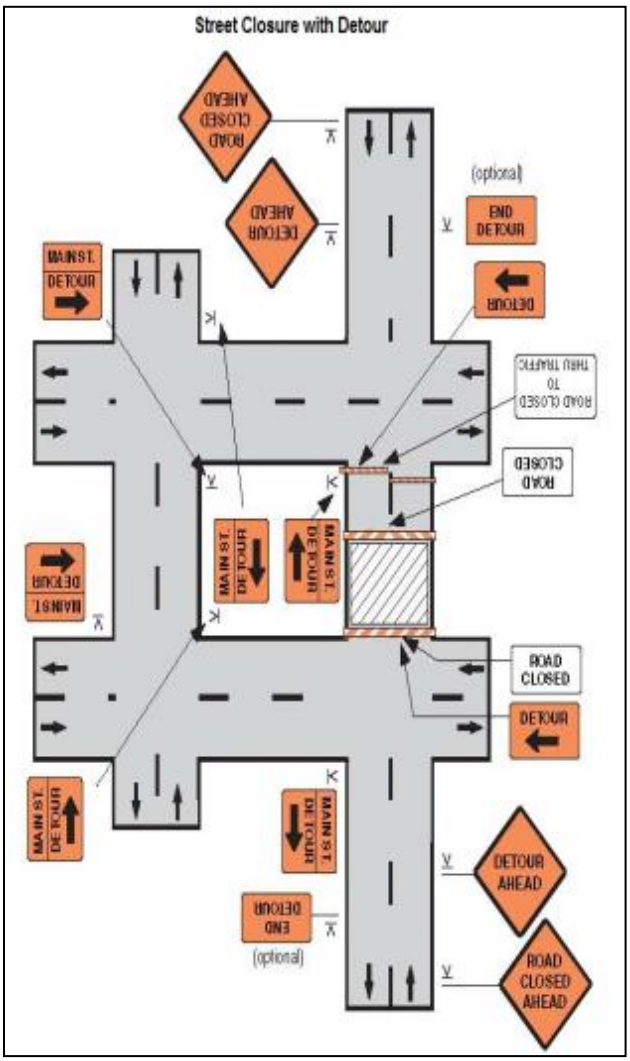


Figure A12: Street closure with detour



Appendix 5: Records of Public Consultations and FGDs

FGD Summaries- Solid Waste Management, Magura Pourashava

SL No.	Proposed Project Facility/Alignment Related to Which Discussion Held	Date	Venue	No. of Participants & gender	Key Safeguard Issues Discussed	Overall Concerns Expressed Related to Project	Suggestions From People	Willingness to Participate in Project
1.	Landfill site development	Feb 19, 2014, 2:30 pm	Near to the existing waste dumping site in Magura	M=12 F=1 T=13	Odor, dusts, aesthetic view, land value due to waste dumping site	Severe problem associated with odor particularly when wind blows, dust generation during windy weather, uncomforting environment in the village nearby waste dumpsite	People suggest for closing the dumpsite and bringing the area to its original shape/land. Alternatively undertake mitigation measures to solve the existing environmental problems due to waste dumping in the area.	People will extend their cooperation and supports to implement mitigation measures for environmental protection and solving the existing nuisance problems out of waste dumping in the area.
2.	Transfer Station-1	March 7, 2014 11:30 am	Dal Mill, ZT Road, Ward #9, Magura	M=12 F=0 T=12	Odor, unhygienic environment around, aesthetic view of the area. It would be better if the site is located away from the present location as the area is surrounded by shops/houses/ markets. Alternatively, the wastes can directly be loaded into a waste truck.	Existing waste dumping at the site is very problematic to the people around	People want a quality and acceptable solution to improve the environment of the area; instead of dumping wastes here, the collected wastes can be loaded into a waste dump truck for disposal into landfill site. This will improve the environment here and thus existing filthy environment and odor problem will disappear.	The local people will not have any complain to the loading of waste directly into a waste truck on this location subject to the fact that wastes will not fall on the ground. And they will cooperate in the activities by close monitoring.
3.	Transfer station-2:	March 7, 2014 12:30am	In front of Sadar Hospital and other side of , Dhaka Road, Magura	M=7 F=0 T=7	Odor, unhygienic environment around, aesthetic view of the area.	Existing waste dumping at the site is very problematic to the people around	People want a quality and acceptable solution to improve the environment of the area; instead of dumping wastes here, the collected wastes can be loaded into a waste dump truck for disposal into	The local people will not have any complain to the loading of waste directly into a waste truck on this location subject to the fact that wastes will not fall on the ground. And they will cooperate in the activities by

SL No.	Proposed Project Facility/Alignment Related to Which Discussion Held	Date	Venue	No. of Participants & gender	Key Safeguard Issues Discussed	Overall Concerns Expressed Related to Project	Suggestions From People	Willingness to Participate in Project
							landfill site. This will improve the environment here and thus existing filthy environment and odor problem will disappear.	close monitoring.
4.	Medical waste management facilities—waste collection vehicles and incinerator/autoclave	March 8, 2014 7:00pm	Sadar hospital , Magura	M=7 F=0 T=7	Existing medical waste management and proposed medical waste management	O&M cost of the facilities; and their management; location of the facilities to be provided under the subproject	O&M cost must be within their affordability; the proposed facilities to be built relatively at a central location of the hospital, clinics and diagnostic centers.	They will extend their cooperation in the implementation by providing space for storage of medical wastes and putting incinerator in a room
5.	Household waste segregation, collection, waste segregation	March 8, 2014 10:00am	College para, Magura	M=9 F=2 T=11	Source segregation, willingness to participate by waste segregation and payment for waste collection	If they are to pay more than now (50BDT/month) for the service taking	The service charge to be within their affordability and decided by Nagorik Committee in consultation with them	They will extend their cooperation by waste segregation at household level and will also pay for the service.

(M=No. of male participants; F= No. of female participants; T=Total participants)

PHOTOGRAPH

Location: near to the existing waste dumping site in Magura, Date: February 19, 2014



Location: near to Dal Factory, ZT Road, Ward #9, Magura, Date: March 7, 2014



Location: in front of Sadar Hospital and other side of , Dhaka Road, Magura, Date: March 7, 2014



Location: households, Ward No. 9, Magura, Date: March 8, 2014



Focus Group Discussion—Landfill site development under Solid Waste Management Magura
Town: Magura Pourashava
Location: Near to the existing waste dumpsite adjacent to the Highway, Magura
Meeting Place: Open space on a rural road meeting the highway
Date: Feb 19, 2014
Time:2:30pm

List of participants

S L	Name	Sex	Address/Cell Phone	Occupation
1.	Muhammad Abdul Alam	Male	--	Tricycle van driver
2.	Zomi Mollah	Male	01743533899	Student
3.	Muhammad Sajib Hossain	Male	01745782496	Student
4.	Muhammad Halal Sheikh	Male	--	Tube-well mechanic
5.	Muhammad Tajuddin Sheikh	Male	--	Businessman
6.	Mrs. Rahima	Female	--	Housewife
7.	Muhammad Abdur Rouf	Male	01748108409	Cloth maker
8.	Muhammad Abul Kalam Azad	Male	01728994020	Village doctor
9.	Muhammad Masum Billah	Male	01715268906	Service-holder
10.	Muhammad Abdus Somajder	Male	01746491305	Service-holder
11.	Muhammad Rezaul Islam	Male	01843071250	Cycle mechanic
12.	Muhammad Ashraful Islam	Male	01833665192	Businessman
13.	Muhammad Abdul Khalek	Male	01739490511	Farmer

Focus Group Discussion—Transfer Sation-1 under Solid Waste Management Magura
Pourashava: Magura Pourashava
Location: : near to Dal Factory, ZT Road, Ward #9, Magura
Meeting Place: Open space on the road adjacent to the waste dumping site
Date: March7, 2014
Time:11:30am

List of participants

Name	Profession	Address/Cell No.
1. Khokon Sheikh	Sweet shop owner	01712141407
2. Nuruzzaman	Police constable	01912200925
3. Muhammad Iftekharul Islam	Labor, Dal Factory	--
4. Muhammad Tayeeb Ali Sheikh	Labor, Dal Factory	--
5. Muhammad Masum Billah	Businessman	01982680781

6. Muhammad Rafiqul Islam	Businessman	01711944869
7. Muhammad Rasedul Islam	Student	--
8. Muhammad Rabiul Islam	Student	--
9. Muhammad Fateh Ali Tipu	Businessman	01917760067
10. Muhammad Nahidul Islam Ujjol	Shop owner	01942226479
11. Onik Rahman	Student	01927620521
12. Akhtarujjaman	Businessman	01711152136

Focus Group Discussion—Transfer Sation-2 under Solid Waste Management Magura
Pourashava: Magura Pourashava
Location: in front of Sadar Hospital and other side of Dhaka Road, Magura
Meeting Place: Roadside tea stall
Date: March7, 2014
Time:12:30am

List of participants

Name	Profession	Address/Cell No.
1. Jhontu Sikder	Tea shop owner	019645591393
2. Muhammad Motahar Hossain	Tea shop owner	01821644942
3. Makhon	Sweeper, Sadar Hospital	01769152436
4. Touhid	Drain Contractor	01710820802
5. Nurul Islam	Agriculture farmer	--
6. Muhammad Reazul Islam	Tea Stall owner	--
7. Osman Goni	Medical technologist, Sadar Hospital	01911966243

Focus Group Discussion with Clinic Owners' Association—Medical waste management under Solid Waste Management Magura
Pourashava: Magura Pourashava
Location: Magura Pourashava Office
Meeting Place: Mayor's room
Date: March8, 2014
Time:7:00pm

Name	Profession	Address/Cell No.
1. Muhammad Robiul Islam	Owner of Ibne Sina Clinic and cashier of the association	01716050350
2. Md Babor Ali	Owner of Sunmoon Clinic and Vice-president of the Association	01711805375
3. Md. Tarek Hossain	Owner of New Arafat Clinic and member of the Association	
4. Advocate Hasanuzzaman	Owner of Saleh Clinic and President of the Association	01718654234
5. Muhammad Nazmul Hoque	EXEN, Pourashava Magura	
6. Muhammad Iqbal Akhtar Khan	Mayor, Magura	01716022599
7. Muhammad Abdul Momin Khondaker	Environmental safeguard Specialist	01672305588

Focus Group Discussion with household head—existing waste management systems under Solid Waste Management Magura
Pourashava: Magura Pourashava
Location: Ward #9, Magura
Meeting Place: at a household
Date: March 8, 2014
Time:10:00am
List of Participants

Name	Profession/beneficiaries	Holding number/address
1. Muhammad Enayet Karim	Service beneficiary	H5296, Zilla Para, Ward#9
2. Bithi Kabir	Service beneficiary	H41, Zilla Para, Ward#9
3. Maya Rani	Service beneficiary	H41, Zilla Para, Ward#9
4. AKM Bodiul Karim	Service beneficiary	H38, Zilla Para, Ward#9

5. Muhammad Salauddin	Service beneficiary	H38, Zilla Para, Ward#9
6. Mukti Biswas	Service beneficiary	H38, Zilla Para, Ward#9
7. Muhammad Masudul Hoque	Service beneficiary	H38, Zilla Para, Ward#9
8. Kazi Sahabuddin	Service beneficiary	H14, College Para, Ward#9
9. Oliullah Zoarder	Service beneficiary	H160, College Para, Ward#9
10. Muhammad Ashraf Hossain	Service beneficiary	H160, College Para, Ward#9
11. Muhammad Oliar Rahman	Service beneficiary	H160, College Para, Ward#9
12. Sadhon	Waste collection van driver	

Appendix 6: Sample Grievance Registration Form

(To be available in Bangla and English)

The _____Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date		**Place of Registration**			
Contact Information/Personal Details					
Name		**Gender**	* Male * Female	**Age**	
Home Address					
Place					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where, and how) of your grievance below: If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or use on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of Official Registering Grievance)	
Mode of Communication: Note/Letter E-mail Verbal/Telephonic	
Reviewed by: (Names/Positions of Officials Reviewing Grievance)	
Action Taken:	
Whether Action Taken Disclosed:	Yes No
Means of Disclosure:	

Appendix 7: Sample Semi-Annual Reporting Format

This template must be included as an appendix in the EIA/IEE that will be prepared for the project. It can be adapted to the specific project as necessary.

I. INTRODUCTION

- Overall project description and objectives
- Description of subprojects
- Environmental category of the sub-projects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and sub-project progress and status

No.	Sub-Project Name	Status of Sub-Project				List of Works	Progress of Works
		Design	Pre-Construction	Construction	Operational Phase		
		☐	☐	☐	☐		
		☐	☐	☐	☐		
		☐	☐	☐	☐		

Compliance status with National/ State/ Local statutory environmental requirements

No.	Sub-Project Name	Statutory Environmental Requirements	Status of Compliance	Action Required

Compliance status with environmental loan covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

II. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:

(i) What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries?
(ii) If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
(iii) Adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;
(iv) Are there designated areas for concrete works, and refueling?
(v) Are there spill kits on site and if there are site procedure for handling emergencies;
(vi) Is there any chemical stored on site and what is the storage condition?

(vii) Is there any dewatering activities if yes, where is the water being discharged;
(viii) How are the stockpiles being managed;
(ix) How is solid and liquid waste being handled on site?
(x) Review of the complaint management system;
(xi) Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

III. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

Brief description on the approach and methodology used for environmental monitoring of each subproject

- Monitoring of environmental IMPACTS on PROJECT SURROUNDINGS (ambient air, water quality and noise levels)
- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LAeq (dBA) (Monitoring Results)	
			Day Time	Night Time

IV. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

Summary of follow up time-bound actions to be taken within a set timeframe.

V. APPENDIXES

Photos
Summary of consultations
Copies of environmental clearances and permits
Sample of environmental site inspection report
Others